APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-498/89-41 Operating License: NPF-76
50-499/89-41 NPF-80

Dockets: 50-498
50-499

Licensee: Houston Lighting & Power Company (HL&P)
P.O. Box 1700
Houston, Texas 77001

Facility Name: South Texas Project (STP), Units 1 and 2

Inspection At: STP, Matagorda County, Texas

Inspection Conducted: October 1-31, 1989

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Approved: E. J. Holler 11/21/89
E. J. Holler, Chief, Project Section D Date
Division of Reactor Projects

Inspection Summary

Inspection Conducted October 1-31, 1989 (Report 50-498/89-41; 50-499/89-41)

Areas Inspected: Routine, unannounced inspection of plant status, onsite followup of plant events, licensee action on previous inspection findings, onsite followup of written reports of nonroutine events, monthly maintenance observations, monthly surveillance observations, operations safety verification, installation and testing of modifications, engineered safety feature system walkdown, nonroutine reporting program, and plant startup from refueling.

Results: Within the areas inspected, no violations were identified. The inspectors noted a number of discrepancies regarding the vibration and loose parts monitoring system (paragraph 8). Procedure discrepancies associated with the essential cooling water and other systems were identified to the licensee for inclusion in the licensee's ongoing procedure upgrade program (paragraphs 10 and 12). The licensee's actions regarding a Part 21 notification concerning Limitorque supplied melamine torque switches appeared appropriate (paragraph 11).

DETAILS

1. Persons Contacted

*J. R. Lovell, Technical Services Manager
*W. H. Kinsey, Plant Manager
*A. C. McIntyre, Manager, Support General
*T. J. Jordan, Manager, Plant Engineer
*J. W. Loesch, Manager, Plant Operations
*C. G. Brown, Outage Manager
*W. S. Blair, Maintenance Support Manager
*L. G. Weldon, Operations Training Manager
*D. A. Leazar, Reactor Support Division Manager
*A. K. Khosla, Senior Licensing Engineer
*S. L. Rosen, Vice President, Nuclear Engineering and Construction
*R. W. Chewning, Vice President, Nuclear Operations
*A. W. Harrison, Supervising Licensing Engineer
*J. E. Geiger, General Manager, Nuclear Assurance
*C. A. Ayala, Supervising Licensing Engineer

In addition to the above, the inspectors also held discussions with various licensee, architect engineer (AE), maintenance, and other contractor personnel during this inspection.

*Denotes those individuals attending the exit interview conducted on November 1, 1989.

2. Plant Status

Unit 1 began this inspection period in Mode 5 (cold shutdown) with reactor reassembly essentially complete following the first refueling outage. On October 14, 1989, zero power physics testing was commenced and the reactor was taken critical on October 15, 1989. Unit 1 entered Mode 1 operation on October 17, 1989. Reactor thermal power was increased in stages and, at the close of this inspection period, Unit 1 was operating at 96 percent reactor thermal power.

Unit 2 began this inspection period at 100 percent reactor thermal power. On October 13, 1989, the unit tripped due to negative flux rate from a dropped control rod. Unit 2 entered Mode 1 on October 15, 1989, and reached 100 percent reactor thermal power on October 17, 1989, and remained at that level through the close of this inspection period.

3. Onsite Followup of Plant Events (93702)

On October 13, 1989, an engineer reviewing completed safety injection check valve surveillance tests prior to taking Unit 1 critical after the first refueling outage, noted that all the test results indicated zero leakage. This raised his suspicions and he and a colleague questioned the operators and shift supervisors involved regarding how the tests were

performed. The engineer's suspicions that the test equipment was malfunctioning were strengthened after the equipment was demonstrated for him and he raised his concerns through his management to the plant manager. The startup was delayed to investigate the concerns which ultimately proved to be well founded, in that the test equipment was, in fact, malfunctioning. The test equipment was repaired, the test rerun, and the startup subsequently completed on October 15, 1989.

On October 13, 1989, at 5:45 p.m., Unit 2 tripped from 100 percent reactor power. The trip occurred when two of four power range neutron monitoring channels detected high neutron flux negative rate. The turbine tripped on the reactor trip and feedwater isolation valves closed on low reactor coolant system average temperature. Auxiliary feedwater was initiated approximately 10 seconds after the reactor trip from low steam generator water level as expected. Approximately 4 minutes following the reactor trip, the operators closed the main steam isolation valves to prevent excessive cooldown. No safety injection actuation occurred and the plant was stabilized in Mode 3.

The licensee examined the sequence of events (SOE) report and other computer alarm logs to determine the cause of the negative rate trip. Due to computer scan frequency limitations, no conclusive evidence was found to confirm whether one or more control rods had inadvertently fallen into the reactor core. Operations personnel inspected the rod control system power supplies (two motor-generator sets). Both were found running normally and supplying the required voltage with no indicated faults. The rod control system power cabinets (five) were then inspected and no blown fuses nor abnormal conditions were detected. The reactor trip breakers were reclosed and all seven rod banks were sequentially withdrawn to six steps (approximately 4 inches) and reinserted in an effort to isolate any dropped control rod(s) because of rod control system failure. All rods (57) responded on the digital rod position indication (DRPI) system. Because an intermittent failure affecting one or more control rods was indicated, the licensee inspected the rod control system power cabinets for loose connections. When no loose connections were found, the resistance of all stationary gripper coils was measured from the power cabinets, no abnormal readings were found. The power cabinet direct current (DC) power supplies (four per cabinet) were tested. One of the power supplies (backup) was found inoperative and replaced. Later, the licensee determined that this was unrelated to the reactor trip because the primary power supply was operative and did not lose alternating current (AC) supply. The licensee performed a comprehensive test of the rod control system (Control Rod Drive Mechanism Timing Test) to obtain DC current profiles of the stationary and moveable grippers and lift coils for each mechanism. No abnormal conditions were detected from the resulting data.

The licensee installed a recorder to monitor stationary gripper circuits and isolate the intermittent failure upon recurrence. At approximately 6:09 a.m., on October 15, 1989, while withdrawing Control Bank A rods as part of a reactor startup, Rod F-8 dropped from 21 steps (approximately 13

inches). All withdrawn rods were reinserted. Troubleshooting revealed an open diode in the stationary gripper circuit for Rod F-8. The diode was replaced and a reactor startup was begun at 6:53 p.m. The reactor neutron flux was mapped at approximately 10 percent power to confirm the DRPI system indication. The licensee intends to inspect all the stationary gripper circuit diodes in the rod control system during the next scheduled outage on each unit.

No violations or deviations were identified in this area of the inspection.

4. Licensee Action on Previous Inspection Findings (92701)

(Closed) Open Item 498/8923-01: "Obtaining Plant Operations Manager Approval to Perform Tests" - Unit 1

In NRC Inspection Report 50-498/89-23; 50-499/89-23, a concern was identified in the area of administrative approval for performing work. The shift supervisor gave technicians approval for performing a surveillance test, but the procedure designated the plant operations manager to provide the approval. The licensee stated a revision to the procedure was to be implemented to delete the requirement for the plant operations manager signature.

Procedure 1PSP05-RC-0458, "Pressurizer Pressure Set 4 Calibration (P-0458)," Revision 1, was recently revised by Field Change Request (FCR) 89-2088. FCR 89-2088 deleted the requirement that the plant operations manager's signature (and associated concurrence) was needed prior to performing the procedure. FCRs were written to revise other procedures applicable to the same concern. This item is closed.

(Closed) Violation (498/8775-01): "Chemical Detection System Inoperability" - Unit 1

The improper status of the toxic gas monitors and resulting inoperability of the control room heating, ventilation, and air conditioning (HVAC) system to automatically isolate the control room in case of an accident was an apparent violation of NRC requirements. This event was reported in Unit 1 Licensee Event Report (LER) 87-22.

The inspector verified that the licensee's documentation of corrective action was appropriate. The licensee had conducted training of key personnel on the proper method for toxic gas system surveillance channel checking and applicable system indications. The training was documented on attendance sheets. The licensee had completed corrective actions including training personnel, revising procedures, and convening a toxic gas monitoring system task group. Work had been completed as required by Maintenance Work Request (MWR) HE-87035823. Plant Procedure OPGP03-ZO-0004, "Plant Conduct of Operations," had been revised (Revision 7). Unit 1 LER 87-22 was closed in NRC Inspection

Report 50-498/88-70; 50-499/88-70. The inspector determined that the licensee's corrective actions were adequate. This item is closed.

(Closed) Violation (498/8847-01): "Failure to Meet Technical Specifications Surveillance Requirements" - Unit 1

The licensee discovered that the surveillance test for the undervoltage and shunt trip devices of the reactor trip breakers did not meet the staggered test basis requirement and that the 31-day check of fuel oil contamination for the No. 11 Diesel Generator Fuel Oil Storage Tank had been missed. This event was reported in Unit 1 LER 87-40.

The inspector verified that the licensee's documentation of corrective action was appropriate. The licensee issued a directive to emphasize the requirement that surveillances be performed on their due dates and that the use of the grace period be limited. The licensee had completed corrective actions. Procedure OPGP03-ZE-0004, "Plant Surveillance Program," had been revised (Revision 8). Unit 1 LER 87-40 was closed in NRC Inspection Report 50-498/88-70; 50-499/88-70. The inspector determined that the licensee's corrective actions were adequate. This item is closed.

(Closed) Violation (498/8727-02): "Failure to Provide Adequate Design Change Control" - Unit 1

A design change notice issued in 1980, but never implemented, was erroneously incorporated. As a result of this error, both the Bechtel drawing and calculation indicated a 1/2-inch weld on the column-to-base plate connection of certain residual heat removal (RHR) pump supports while the actual as-built condition was a 5/16-inch weld.

The licensee performed a reinspection of the affected RHR pump supports to verify that the weld size was 5/16-inch. The licensee determined that an increase of the weld from 5/16-inch to 1/2-inch was not required. A design calculation (Bechtel Calculation No. SC045-4B, Revision 7), was revised to specifically document the conclusion that the smaller weld size was adequate. Drawing 3C01-9-S-1600, Revision 8, was revised to show the appropriate size weld. The current revision for this drawing is Revision 9. The licensee's investigation of this matter indicated that this was an isolated case. The inspector determined that the licensee's corrective actions were adequate. This item is closed.

(Closed) Violation (498/8811-01): "Inoperable Feedwater Flow Transmitters Due to a Procedural Deficiency" - Unit 1

A licensed shift technical advisor discovered during performance of precritical feedflow/steamflow transmitter calibrations that 7 of 12 feedflow transmitters had been isolated. This event was reported in Unit 1 LER 87-16.

The inspector verified that the licensee's documentation of corrective action was appropriate. The licensee verified that TS required instrumentation was in service and TS instrumentation checklists were incorporated into Plant Procedure 1POP03-ZG-0001, "Plant Heat-up," Revision 7. The licensee also reviewed the status of plant systems and reperformed valve lineups. Unit 1 LER 88-16 was closed in NRC Inspection Report 50-498/88-70; 50-499/88-70. This violation was addressed as a part of Enforcement Action (EA) No. 88-112, dated September 21, 1988. The inspector determined that the licensee's corrective actions were adequate. This item is closed.

(Closed) Violation (499/8907-01): "Failure to Follow Procedures/ Inadequate Procedure" - Unit 2

Activities affecting quality were not prescribed by procedures appropriate to the circumstances, in that three examples were noted where approved procedures were not followed and one example where an approved procedure was not appropriate to the circumstances.

The licensee identified the root causes of each of the four examples in this violation. The corrective actions included:

- The licensee corrected seven discrepancies identified during the review of 539 procedures. The scope of this review included the current revision of quality-related procedures that had FCRs against the revision issued just prior to the current revision.

- A flaw in the procedure program which permitted an FCR to be issued against a procedure and not evaluated for incorporation into the next revision prior to its issuance was corrected by Revision 17 to Procedure OPGP03-ZA-0002, "Plant Procedures."

- Preparation of Procedure OPGP03-ZM-0028, "Erection and Use of Temporary Scaffolding," Revision 0, and by revision to Procedure OPGP03-ZI-0002 (Revision 2), "Erection and Use of Temporary Scaffolding."

The licensee completed appropriate corrective actions to preclude recurrence and corrective actions were responsive to the four identified examples in the NOV. This item is closed.

(Closed) Violation (498;499/8911-01): "Failure to Analyze Possible Effects of Energized Space Heaters Used Within The Motor Operator" - Units 1 and 2

The equipment qualification file for eight auxiliary feedwater valves with space heaters installed and energized did not support qualification. This was due to a failure to analyze all possible effects of energized space heaters used within the motor operators. No analyses were contained in the licensee's files to fully establish qualification for air temperature rises of cables, wires, splices, and components resulting from their proximity to the heaters.

The licensee's corrective actions included the following:

- The space heaters for the affected motor operated valves (MOVs) were de-energized. Engineering Change Notice Package (ECNP) No. 89-L-0038-A required the heater leads to eight MOVs (four in Unit 1 and four in Unit 2) to be disconnected and identified as spare leads. The drawings were revised. The installation records provided instructions for cable, raceway, and terminations installation. The inspector verified that the design change checklist was properly completed.

- The affected MOVs were evaluated to determine the impact of the energized space heaters. The review determined that the energized space heaters would not have significantly increased the temperature of the motors above normal ambient conditions; therefore, there was no adverse impact on the qualified life or operation of any component because of the existence of energized space heaters in the DC power Class 1E motors. The valve operator vendor confirmed that no adverse effect on the intended safety function for either the valves or motor operators would occur if the heaters were connected and operated.

- The design was reviewed to determine other instances where space heaters had been energized inappropriately. None were identified.

The inspector determined that the licensee's corrective actions were adequate. This item is closed.

(Closed) Violation (498;499/8917-01): <u>"Falsified Fire Watch Logs Entry" - Units 1 and 2</u>

An individual assigned to fire protection system compensatory hourly fire watches initialed a fire watch log indicating that he had passed through the required area checking for signs of fire when, in fact, he had not passed through the required areas within the required time interval.

The licensee determined that the root cause of the failure to perform fire watches and the falsification of the fire watch logs was dereliction of duty by the individual. A contributing factor was the established practice of leaving a blank space on the fire watch log sheet to highlight that a fire watch round had been missed ("skipped").

The licensee's corrective action included:

- Conducting an investigation to determine the extent of the irregularities in the fire watch program. No other findings involving other personnel were identified during the investigation.

The individual identified as having falsified the fire watch logs was removed from fire watch duty.

- Giving written instruction to fire watch personnel (Office Memorandum - Station Problem Report (SPR) 89-318, dated June 15, 1989) to make all entries on the fire watch logs consecutively and to "skip" no lines. Paragraph 5.7.2.4, Procedure OPGP03-ZF-0013, "Fire Watch Program," was revised (Revision 3) to include, "NOTE All entries on the "Fire Watch Log" shall be continuous. NO lines shall be skipped. This statement partially fulfills the commitments in response to SPR 890-318."

- Reinstructing fire watch personnel on the consequences of falsifying records. Training included a review of NRC Information Notice No. 89-18, "Criminal Prosecution of Wrongdoing Committed By Suppliers of Nuclear Products or Services," dated February 22, 1989. Attendance at this training was verified by the inspector from the attendance sheets for course title "SPR 89-318 - Fire Watch Retraining." New personnel receive this training through general employee training (GET) Category I and other personnel receive this training through the GET requalification program.

The inspector determined that the licensee's corrective actions were adequate. This item is closed.

(Closed) Unresolved Item (498/8873-03): "Installed Plant Instrumentation Calibration Verification Program" - Unit 1

The failure to complete documentation of an "as-found," out-of-tolerance condition was considered unresolved pending further inspection to determine whether proper use and distribution of the calibration deficiency reports were maintained.

The inspector did not find evidence to conclude that the failure to complete documentation of the "as-found," out-of-tolerance condition was more than an isolated incident.

The licensee's actions regarding this matter included the following:

- Procedure OPGP03-ZM-0016, "Installed Plant Instrumentation Calibration Verification Program," was revised (Revision 1) to require problem reports to be written if instruments within the scope of the procedure were out-of-tolerance.

- FCR 89-0054 and FCRs 89-0058 through 89-0064 were prepared to revise applicable generic plant procedures. These procedures delineated programmatic controls for calibration and status verification/notification of installed permanent plant instrumentation. The procedures are applicable to quality/nonquality-related display instruments used in routine

operating procedures or surveillances. Procedures revised include the following:

- OPMP08-ZI-0134, "Generic QDPS Loop Calibration," Revision 0, page 9
- OPMP08-ZI-0002, "Pressure Transmitter or Differential Pressure Transmitter Calibration," Revision 1, page 6
- OPMP08-ZI-0007, "Generic Recorder Calibration," Revision 2, page 5
- OPMP08-ZI-0002, "Pressure and Differential Pressure Switch Calibration," Revision 3, page 6
- OPMP08-ZI-0011, "Generic Temperature Switch Calibration," Revision 5, pages 6 and 11
- OPMP08-ZI-0016, "Generic Indicator Calibration," Revision 2, pages 4 and 6
- OPMP08-ZI-0016, "Generic 7300 Loop Calibration," Revision 0, pages 8 and 11
- OPMP08-ZI-0203, "Pressure or Differential Pressure Indicator Calibration," Revision 4, pages 7 and 10

The inspector determined that the procedures developed and revised to preclude recurrence were appropriate. The inspector had no further questions. This item is closed.

(Closed) Open Item (498/8755-01): <u>Power Operated Relief Block Valves - Unit 1</u>

During a tour of the reactor containment building (RCB) it was noted that the pressurizer power operated relief block valves exhibited body-to-bonnet leakage. Further investigation by the licensee revealed that the body-to-bonnet fasteners were torqued below their specified values.

The licensee's investigation determined the following:

- The valve outlet centerline to inlet flange face dimension tolerance of 1/4-inch to minus 1/8-inch may contribute to permitting leakage when replacement valves are installed.
- The second valve installed in May 1987 had been machined on the inlet face approximately 1/8-inch to remove surface scratches.
- The discharge side was torqued (after the valve was "placed" on the inlet flange with quality control (QC) verification of gasket

material) before the inlet side was final torqued. This, in conjunction with the machined surface, could have caused inlet piping movement/induced stresses.

- The criteria (i.e., 3/64-inch per foot of flange face diameter) may not have been appropriate to this unique valve to pipe flange assembly. The inlet flange gap closure criteria was revised and included in the Crosby Safety Relief Valve Manual.

- The Westinghouse installation instructions (ST-WN-YB-1142) were incorporated into the construction process Sheet No. 0266, Revision 0, and documented to be satisfactory by the Ebasco QC mechanical equipment group (prior to the sequence where pipe welding was initiated).

- One of the leaking valves, 1-RC-PSV-3451, 12-inch outlet flange bolted to a 12-inch ring header, was found with excessive misalignment. This required weld repair on the discharge flange of the header assembly. Final assembly of the valve subsequent to weld repair (Field Weld FW-PVL-0004) required a vertical and lateral pull. Nonconformance Report (NCR) No. 87-160 permitted cold springing of the inlet line to align valve discharge flange to pipe flange. The force on the valve was measured with a load cell. The force required did not exceed the maximum force permitted.

- The valve, 1-RC-PSV-3451, was reinstalled on the inlet pipe and torqued to 500 foot-lbs. Westinghouse completed the as-installed analysis of this valve and loop seal. A verified copy of this analysis is maintained on Westinghouse Gas Turbine Service Division auditable file as a permanent plant record. This analysis verified that the installation and operation of the valves met ASME Code, Section III, requirements.

- The final as-built analysis and evaluation of the pressurizer safety and relief line piping system evaluation (PSARV) was completed. The piping and support results met ASME Code requirements. The ring header assembly (pressurizer nozzle, inlet piping, safety valve, discharge manifold, and support system) was demonstrated adequate and met ASME Code, Section III, requirements.

- The valves were reinstalled using new gasket material. The inlet flange bolts were final torqued and verified at 790 foot-lbs and discharge flange bolts were final torqued to 410 foot-lbs per Revision 3 of the NCR. Final installation of the valves was monitored by quality assurance (QA) quality control (QC).

- Procedure OMP04-RC-0008, "Pressurizer Safety Valve Removal and Reinstallation," was revised (Revision 2) to provide instructions for the removal and reinstallation of pressurizer safety valves.

The inspector's review of the licensee's investigation, corrective actions, and procedure revision to preclude recurrence determined that the licensee's actions were appropriate. The inspector had no further questions. This item is closed.

5. Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities (92700)

(Closed) Unit 1 LER 87-20: "Control Room Ventilation Actuation to Recirculation Mode Due to a Failure of a Toxic Gas Monitor Computer Chip" - Unit 1

On November 28, 1987, with Unit 1 in Mode 4 and prior to initial criticality, an auto-actuation of the control room ventilation to recirculation mode occurred as a result of a malfunction of a toxic gas monitor.

The licensee's investigation determined that the event was caused by a failed programmable read-only (ROM) computer chip in the toxic gas monitor. The failed computer chip was replaced as required by MWR HE-870351C1. Setpoint changes, revisions to actuation logic (control room HVAC actuation will now occur on 2/2 monitor failure/loss of power rather than 1/2), and relocation of sample points, separate annunciator windows, and non-1E power supplies were completed as required by Configuration Control Package (CCP) 2-J-ST-0459. The toxic gas monitor was tested and restored to normal operation. The inspector determined that the licensee's corrective actions were satisfactory. This item is closed.

(Closed) Unit 1 LER 88-33: "Air Binding of Charging Pump Suction Line From The Refueling Water Storage Tank Due to a Design Error" - Unit 1

On April 18, 1988, during testing of Unit 2 centrifugal charging pumps (CCHPs), a loss of suction pressure to the CCHPs occurred on "swap over" from the volume control tank (VCT) to the refueling water storage tank (RWST).

The licensee's investigation determined that the cause of this event was a design error in the piping configuration from the RWST to the CCHP suction which resulted in a high point that released entrained air. Air collected and formed a pocket when the RWST level was reduced below elevation 25' 6" (Unit 1 was in Mode 5 at the time of discovery). The piping configuration on Unit 2 is identical to the piping configuration on Unit 1.

A review of this event was performed by engineering department personnel. The review determined that the RWST volume required by the Technical Specifications (TS) was adequate for Modes 1, 2, 3, 4, and 6. However, the Mode 5 minimum volume requirement of 122,000 gallons was below the loss of net pump suction head (NPSH) level. At the time of discovery, the RWST volume was greater than 458,000 gallons; therefore, the licensee met TS requirements.

The licensee completed the following corrective actions for Units 1 and 2:

- Operating procedures were revised to require a minimum volume of 378,000 gallons in the RWST when the RWST is used as a boration source in Mode 5 (TS permits RWST to be out of service when in Mode 5).

- A review of suction piping configuration to other safety-related and Class 7 pumps was performed. No suction line configurations were found that could cause air binding similar to the CCHPs line from the RWST.

- The RWST to CCHP 8-inch piping was rerouted in accordance with Plant Modification No. 88246, Contractor Work Request (CWR) No. 005393, CCP No. 2-M-FST-0285, and final Calculation Package 2-A-30-HNC-0001, "RWST Verification of Level," Revision 0.

- Startup Field Report PFM M19 verified that, after the modifications were completed, no loss of suction occurred under the conditions specified.

The inspector's review of the licensee's investigation, corrective actions, and modifications developed to preclude recurrence indicated that the licensee's actions were appropriate. The inspector had no further questions. This item is closed.

(Closed) Unit 1 LER 88-45: "Reactor Trip Due to Personnel Error While Troubleshooting Qualified Display Processing System" - Unit 1

On July 19, 1988, Unit 1 was in Mode 1. A reactor trip occurred as a result of a troubleshooting activity when a technician reset the wrong qualified display processing system (QDPS) processor.

The licensee's investigation determined the following:

- On July 18, 1988, two technicians were calibrating the reactor coolant system (RCS) hot leg temperature inputs to QDPS. The technicians completed the calibration of the RCS Loop B inputs to QDPS Processor D. The procedure did not contain specified steps to ensure proper reset. The technicians were unaware of the proper method to restore the system. The technicians subsequently reset RCS Loop B instrumentation channel with QDPS Processor D "locked up."

- After the shift change, another technician was assigned to continue the troubleshooting. While troubleshooting, the technician incorrectly placed QDPS Processor B in test (the QDPS processor associated with the RCS Loop B temperature was Processor D). The technician then informed the control room operator that the technician was going to reset the QDPS processor associated with the RCS Loop B. The technician then returned the QDPS processor to normal and operated the reset switch. Reset of QDPS Processor B caused the calculated value of T-hot to momentarily go to zero while

reactor trip system (RTS) Channel II was in test. This resulted in a reactor trip on over temperature/delta temperature.

- The root causes of the reactor trip were selection of the wrong QDPS cabinet by a technician and a technician returning the RCS Loop B hot leg temperature channel to service with the QDPS Processor D "locked up."

The licensee's corrective actions included:

- Holding training immediately after the event, for the technicians to review the event and identify the need to exercise care when resetting QDPS. Course attendance records were reviewed by the inspector.

- Revising Procedures 1PSP02-RC-0410, "Delta T and T Average Loop 1 Set 1 ACOT (T-0410)," Revision 2; 1PSP02-RC-0420, "Delta T and T Average Loop 2 Set 2 ACOT (T-0420)," Revision 2; 1PSP02-RC-0430, "Delta T and T Average Loop 3 Set 3 ACOT (T-0430)," Revision 2; and 1PSP02-RC-0440, "Delta T and T Average Loop 4 Set 4 ACOT (T-0440)," Revision 2, which required QDPS processors to be reset during restoration, to include specific steps to ensure proper reset during restoration. Procedures for Unit 2 were prepared and are same title and number. except for Unit 2 designation and Revision 0.

- Instructing Instrumentation and Control (I&C) foreman to verify the actions of technicians which could affect the operation of the RTS.

- Evaluating the maintenance procedures which controlled work performed on equipment which could cause spurious trips for the inclusion of human factors aids.

- Adding clarification of independent verification requirements and additional requirements to be observed during troubleshooting of RTS and engineering safety features (ESF) equipment to Procedure OPGP03-ZM-0021, "Control of Configuration Changes During Maintenance or Troubleshooting."

- Placing a board, labeled with four color coded protection channel key sets for protection Channels I, II, III, and IV (separation Groups A, D, B, and C, respectively), in the Units 1 and 2 control rooms. The key sets included keys for the QDPS and Westinghouse 7300 process control (reactor protection system) and are tagged using separation group colors to match the respective cabinets. Personnel have access to only one set of keys at a time. A key log is maintained.

The inspector verified the location (east wall near north wall) and labeling of the key boards and keys in the control rooms of Units 1 and 2. The inspector observed a technician sign out the key in Unit 1 for the auxiliary shutdown panel (ASP) and accompanied the technician on an inspection of the Unit 1 ASP.

The inspector's review of the licensee's investigation, corrective actions, and modifications developed to preclude recurrence indicated that the licensee's actions were appropriate. The inspector had no further questions. This item is closed.

(Closed) Unit 2 LER 89-01: "Partial Loss of Offsite Power Due to a Fire Protection System Actuation" - Unit 2

On January 6, 1989, Unit 2 was in Mode 5 prior to initial criticality. An actuation of the deluge system occurred during restoration of an equipment clearance on a fire protection panel following replacement of the Unit 2 standby transformer heat detectors. Immediately following the actuation, an arc over occurred on Phase B 345 KV transformer bushing. This arc over was followed by a transformer instantaneous phase overcurrent and lockout relay actuation, which resulted in automatic protective action to clear the switchyard south bus and de-energize the faulted line. The licensee verified that no fire occurred and actions were taken to secure the deluge system and restore the plant to normal operating conditions.

Deenergization of the Unit 2 standby transformer resulted in loss of the normal power supply to the ESF Trains B and C. The diesel generators (DG) started and power was restored to the ESF equipment. The effects of the switchyard voltage transient associated with the fault were observed in Unit 1. Some HVAC equipment in Unit 1 tripped off and was subsequently restarted.

The licensee's investigation determined that no panel malfunctions existed and that the standby transformer thermal detector alarm signal was present at the time the clearance was being released. An unlicensed reactor plant operator installed the fuses to restore the actuation circuit. The operator was not familiar with the fire protection panel. This operator did not reset the panel to clear the alarm signal. The operator did not realize that the panel must be reset prior to reactivating the actuation circuit. The licensee identified a lack of procedures in the area of fire protection panel restoration. The licensee determined that the positioning of the standby transformer deluge nozzles resulted in water spray on the Phase B bushing.

The licensee's corrective actions included:

- Developing a procedure (OPEP03-FP-0030), "Transformer Deluge Water Spray Actuation Verification and Valve Reset," Revision 0, dated August 1, 1989, to control the restoration of fire protection panels.

- Developing a procedure (OPOP02-FA-0001), "Fire Detection System," Revision 0, dated May 30, 1989, to provide guidance for fire detection system operation.

- Repositioning the deluge nozzles to reduce impingment on the Unit 2 standby transformer bushings. The nozzle configuration on the deluge

systems for other large transformers were visually examined to ensure that nozzles are not directed at the transformer bushings.

- Incorporating this event into the reactor plant operator (RPO) requalification program. Shift briefings (attendance sheets verified training on "Fire Detection Instructions for Closure of SPR-89-0001") were held on fire protection panel operation (actions for fire, trouble detection or alarm activation).

The inspector's review of the licensee's investigation, corrective actions, and procedures developed to preclude recurrence determined that the licensee's actions were appropriate. The inspector had no further questions. This item is closed.

(Closed) Unit 2 LER 89-20: "Reactor Trip Due to a Simultaneous Trip of Three Feedwater Pumps" - Unit 2

On August 29, 1989, Unit 2 was in Mode 1. All three operating turbine driven feedwater pumps (TDFW) tripped. The licensed reactor operator immediately tripped the reactor in anticipation of low steam generator (SG) level.

The licensee's investigation determined that:

- The TDFW pumps tripped on overspeed following a momentary interruption of control power from an inverter. The overspeed circuitry was designed to fail to the tripped condition on loss of control power. This protection circuitry was added after a destructive feedwater pump turbine overspeed which occurred on Unit 1 on May 25, 1988.

- The interruption in power from the inverter was attributed to a component failure in the static transfer switch circuit of the inverter which feeds the local control panels for the SG feedwater pumps. A contributing cause was the design of the feedwater pump overspeed protection circuit which was not designed to remain in operation during a momentary loss of control power without tripping the pumps.

- The SG feedwater pump overspeed protection circuitry was changed (WRs LP-90891, LP-90892, and LP-90893 and ECNP 89-J-0279 for Unit 2 and WRs LP-84062, LP-84068, and LP-84057 and ECNPs 89-J-0278 and 89-M-0283 for Unit 1) to an "energize to trip" scheme on Units 1 and 2. A mechanical overspeed trip for the overspeed protection for the feedwater turbines does not require a power source. In addition, loss of the electrical bus feeding the feedwater pump turbine electrical overspeed trip also results in a loss of control power which causes the feedwater turbine control valves to close.

The inspector's review of the licensee's investigation, corrective actions, and modifications installed to preclude recurrence indicated that

the licensee's actions were appropriate. The inspector had no further questions. This item is closed.

(Closed) Unit 2 LER 89-21: "Reactor Trip Due to a Defective Feedwater Pump Speed Controller Card Edge Connector" - Unit 2

On September 5, 1989, Unit 2 was in Mode 5. Control room operators observed speed oscillations on turbine driven TDFW 21. The TDFW subsequently tripped on overspeed. The resultant loss of SG level caused a reactor trip and auxiliary feedwater system actuation. The turbine tripped following the reactor trip. The feedwater isolation valves closed on low reactor coolant system average temperature.

The licensee's investigation determined that:

- Prior to this event, TDFW 22 had exhibited erratic speed control. The speed control circuitry for all three TDFWs is housed in a common card frame. Technicians were troubleshooting the speed control problem. One of the printed circuit (PC) cards for TDFW 22 was removed.

- During removal of the PC card for TDFW 22, a defective edge connector on a circuit card for TDFW 21 caused erratic speed controller output and the erratic TDFW speed oscillations. During the posttrip troubleshooting, the effects of disturbance of the PC card frame on TDFW 21 speed controller output was verified.

- The defective PC card edge connector on TDFW 21 was repaired. The card frame alignment was checked and the remaining printed circuit cards and edge connects were inspected. No other defective edge connectors were found.

- The cause of this event was the defective TDFW 21 speed controller PC card edge connector which was inadvertently moved during troubleshooting of a PC card for a different TDFW in the same card frame.

The inspector's review of the licensee's investigation, corrective actions, and procedures developed to preclude recurrence determined that the licensee's actions were appropriate. The inspector had no further questions. This item is closed.

(Closed) Unit 1 LER 88-28: "Leakage of Aluminum-Bronze Essential Cooling Water System" - Unit 1

On April 1, 1988, Unit 1 was in Mode 3. Plant operations personnel observed slight leakage occurring at a number of locations in the aluminum-bronze essential cooling water (ECW) system. This event did not require that an LER be submitted by the licensee. The licensee submitted Unit 1 LER 88-28 as a voluntary LER.

The licensee's investigation determined that some small bore (2-inch diameter and less) fittings and valves in the ECW system had undergone crevice corrosion (dealloying). The dealloying permitted through-wall seepage of ECW.

The licensee's corrective actions included the following:

- Specifying the material for the replacement fitting and valve components to meet ASME Specification SB-169 Alloy C61400 (wrought aluminum-bronze) requirements.

- Replacing cast aluminum-bronze components with fittings and valves machined from wrought aluminum-bronze.

- Issuance of FCRs by design engineering to delete or replace the cast aluminum-bronze components.

- Tracking the disposition of each cast aluminum-bronze component by engineering on the master computer list.

The inspector selected five components and reviewed the engineering and receipt inspection documents associated with the disposition and replacement of the aluminum-bronze cast components. The certified material test reports for the four fittings and one valve selected for review were consistent with the ASME requirements for Alloy C61400 wrought aluminum-bronze. The inspector reviewed the Bechtel Engineering systemmatic method for assuring that all safety-related small bore aluminum-bronze cast components were identified on a master computer list. This event for Unit 2 was reported as Independent Review Committee Report (IRC) IRC-433, "Leakage of Aluminum-Bronze Essential Cooling Water System" - Unit 2. An inspector reviewed the corrective actions for aluminum-bronze fittings and valves in Unit 2 and closed IRC-433 in NRC Inspection Report 50-498/88-79; 50-499/88-79.

The inspector reviewed the licensee's investigation, and corrective actions, to preclude recurrence. The review determined that the licensee's actions were appropriate. The inspector had no further questions. This item is closed.

6. Monthly Maintenance Observations (62703)

The inspector observed selected maintenance activities to verify that the activities were being conducted in accordance with approved procedures and TS. The activities observed included:

- MWR PD-71342; troubleshooting of the 4.16 KV electrical breaker which supplies RCB Chiller 11A. Improper functioning of the breaker interrupt racking mechanism was causing the elevating fuses to fail open on overload whenever an operator attempted to rack the breaker in or out.

- Preventive Maintenance (PM) MM-1-HF-89002343; lubrication and inspection of Train C fuel handling building (FHB) booster fan outlet damper.

- MWR AF-83553; realignment of the pump to motor on Auxiliary Feedwater Pump No. 13.

The inspector verified that the activities were conducted in accordance with approved work instructions and procedures, test equipment was within its current calibration cycle, and housekeeping was maintained in an acceptable manner.

No violations or deviations were identified in this area of the inspection.

7. Monthly Surveillance Observations (61726)

Selected surveillance activities were observed to ascertain whether the surveillance of safety significant systems and components were being conducted in accordance with TS and other procedural requirements. The surveillance activities observed included:

- 2PSP02-RC-0419, "RCS Flow Loop 1 Set 3 ACOT (F-0419)," Revision 0

- 1PSP03-AF-0007, "Auxiliary Feedwater Pump 14 Inservice Test," Revision 5

- 2PSP03-SP-0006S, "Train S Reactor Trip Breaker TADOT," Revision 0

Specific items inspected included verifying that as-left data was within acceptance criteria limits, the acceptance criteria listed in the procedures agreed with values listed in design documents or instrument setpoint indexes, and test equipment used was within its current calibration cycles. Following observation of the surveillance activities, the procedures were reviewed for technical accuracy and conformance to TS requirements. Items noted and discussed with the licensee included:

- Procedure 2PSP02-RC-0419 by I&C technicians to verify that the accuracies of the reactor coolant low flow trip logic circuitry were within acceptable limits. Several minor observations were reported to the licensee: Step 6.2.d called Flow Indicator FI-0417A "Loop 1 Flow," but the indicator was labelled "Loop 2A Flow" on the Unit 2 control panel. On page 3 of 3 of the Analog Channel Operational Test (ACOT) data package, the values listed for the TS allowable value and Comparator Input Trip Voltage varied slightly from values listed in Instrument Loop B2RC-F-0419, Revision 2. The TS allowable value listed in the procedure was 3.296 vdc, but was listed as 3.295 vdc in the instrument loop. Additionally, the comparator input trip voltage was listed as 5.853 vdc in the procedure, but was 5.852 vdc in the instrument loop. The differences in value were due

to rounding off calculated values. The values listed in the procedure were more conservative than required by the instrument loop.

- Performance of Procedure 1PSP03-AF-0007 by Unit 1 operations personnel to verify operability of Auxiliary Feedwater Pump 14, associated valves, and flowpaths. Typographic errors were observed in Step 5.12.2 (incorrect name for Cross Connect Valve FV-7518) and in data sheet (-2) on page 21 (Step 5.12.3 should have been Step 5.12.2 and the "y" of word "by" was missing from Step 5.12.2). Step 5.9.5 in the procedure was revised by FCR 88-1739. The change was made to verify whether Valve AF0011 had returned to a full flow position or not. A review of FCR 88-1739 was performed. A description of the change made to Step 5.7.5 was not included in the "Description of Changes or Reason For Changes" blanks of the FCR. Although Step 5.7.5 was revised in the body of the procedure, the intent of the step apparently did not change.

  Step 5.7.1.6 of Procedure 1PSP03-AF-0007 instructed the operator to start Auxiliary Feedwater Pump 14 by opening Turbine Trip/Throttle Valve MOV-0514. The pump failed to start on the first two attempts. A mechanic was dispatched locally to Valve MOV-0514 to determine why the valve was shutting immediately after travelling to the full open position. With a mechanic present, two more starts were unsuccessfully. The mechanic determined there was too much play in the trip mechanism and made a manual adjustment. On the fifth attempt, the pump turbine started and the valve remained open as required by the procedure. A review of the procedure and vendor manual did not reveal any limitation on the number of pump or turbine starts within a period.

- Performance of Procedure 2PSP03-SP-0006S by Unit 2 operations personnel. The test simulated the trip functions of the Train S Reactor Trip Breaker. The inspector observed the test being performed and compared the procedure to Vendor Manual 0387(2)00002-KWN, "Westinghouse Three Train Solid State Protection System Technical Manual," Section 6.0, "Testing and Troubleshooting." Several differences between the manual and the procedure were observed. For example, procedure Steps 7.7.20 (turn logic switch off) and 7.7.21 (reclose trip breaker) were reversed in the vendor manual. The licensee stated that the reversal of steps had no consequences in the logic test sequence. Step 7.7.16.a instructed the test performer to verify that a meter reading was less than 6 volts, but the vendor manual instructions used a value of 1 volt, not 6 volts. The licensee stated that the 6 volts reading was based on a meter tolerance of $\pm$ 5 volts, therefore, 1 volt plus the tolerance of 5 volts established an upper limit of 6 volts.

  Step 7.8.5 instructed the test performer to verify a meter reading of 43 $\pm$ 5 vdc. The vendor manual instructions used a value of 43 $\pm$ 2 vdc. Again, the tolerance of 5 volts was used by the licensee for

the meter, not the value (2 vdc) listed by the manufacturer. Also, several final checks listed in the vendor manual were not performed in the procedure, including verifying that urgent alarm light goes off and the test indicator lights come on. The licensee stated that verification of these final indicator lights status was determined not to be required.

No violations or deviations were identified in this area of the inspection.

8. Operational Safety Verification (71707)

The purpose of this inspection was to ensure that the facility was being operated safely and in conformance with licensee and regulatory requirements. This inspection also included verifying that selected activities of the licensee's radiological protection program were being implemented in conformance with requirements and procedures, and that the licensee was in compliance with its approved physical security plan.

The inspectors visited the control room on a daily basis when onsite and verified that control room staffing, operator behavior, shift turnover, adherence to TS limiting conditions for operation, and overall control room decorum were being conducted in accordance with requirements

Tours were conducted in various locations of the plant to observe work and operations to ensure that the facility was being operated safely and in conformance with license and regulatory requirements. The following items were observed and discussed with licensee representatives who took appropriate corrective action.

The inspection and review of the Vibration and loose parts monitoring system (VLPMS) and associated procedures were performed during this inspection period. The VLPMS consists of permanently installed sensors that monitor selected locations on the reactor vessel and SGs, and the control room electronics that receive the sensor's signals. The system is designed to detect excessive motion of core internals and noise resulting from loose parts in the RCS. The system is nonsafety-related and is not listed in the TS. However, the system is described in Section 4.4.6.4 of the Final Safety Analysis Report (FSAR) and was designed to meet the guidance of Regulatory Guide (RG) 1.133, "Loose-Part Detection Program for the Primary System of Light Water Cooled Reactors."

Electronics panels are located in both the Unit 1 and 2 control rooms. The electronics in the panel include a vibration and loose parts monitor, tape recorder, and loose parts locater printer. The monitor provides alarm indication, channel selection switches, a speaker for audio listening of selected channels, a deciblemeter to display the vibration level, and power and test lamps. The tape recorder is used to simultaneously record those signals or combination of signals in the event of an alarm that is not readily interpretable, or for which additional analysis or permanent record is desired. The loose parts locator is a

microprocessor-based subsystem that assists the operator in locating loose parts detected by the VLPMS. The locator will automatically print messages with a printer mounted in the electronics cabinet. A separate spectrum analyzer can be connected to the VLPMS circuitry to provide permanent signature analysis plots.

As part of the VLPMS inspection, the following procedures were reviewed:

- OPEP02-IB-0001, "Vibration and Loose Parts Monitoring System Data Collection and Processing," Revision 0
- 1POP02-IB-0001, "Loose Parts Monitoring System," Revision 1
- OPGP03-ZE-0019, "Loose Parts Monitoring Program Description," Revision 2
- 1POP02-AN-09M1, "Annunciator Lampbox 1-09M-1 Response Instructions," Revision 2 (only for Alarm 09M1-B-8, Loose Parts Sys TRBL)

The procedures were compared to the vendor manual, 14926-4136-00020-AAW, "Operating Instructions Loose Parts Monitor System." Additionally, the performance of OPEP02-IB-0001 on the Unit 1 VLPMS was witnessed by the inspector. All observations made were reported to the licensee for comment and resolution.

Procedure OPEP02-IB-0001 described the process necessary to obtain VLPMS data when required for recording of baseline data (which can be compared to future values) or following up on alarmed conditions. During a performance of OPEP02-IB-0001, the inspector observed that the tape recorder STOP light bulb was burned out and the 15 IPS (inches per second) tape recorder speed select button was missing its nameplate. Step 3.3 required one tape to be used to record all data, but the test performer actually used two tapes for two sets of data. Section 4.0 (Procedure) also was written assuming one reel of tape was to be used, but two were used. The procedure required the use of measuring and test equipment to record data, but the requirement to obtain the equipment was missing from the prerequisite section of the procedure. The procedure did not mention initial VLPMS switch positions needed to perform the test. Specifically, the selection of tape speed (6 choices available) and position of the AUTO/MANUAL toggle switch (should have been manual) and the TACH/TAPE servo switch (should have been TACH) positions were not specified. Step 4.4 instructed the technicians to "load an unrecorded tape reel on the Hewlett Packard 3968A tape recorder." This one step was described in Procedure 1POP02-IB-0001 in 11 steps. OPEP02-IB-0001 should include the same 11 steps (greater level of detail) or reference 1POP02-IB-0001.

Procedure 1POP02-IB-0001 provided instructions for the normal operation of the VLPMS. Procedure Steps 5.3 and 5.4 instructed the operator to manually test the VLPMS indicator lights by pressing the TEST, then RESET, buttons. Step 5.5 provided instructions to "place the MANUAL-AUTO switch in the AUTO position." Per the vendor manual, "the MANUAL/AUTO switch

should be toggled to MANUAL then AUTO after the reset." Step 5.5 could have been more specific to ensure that the circuitry was properly placed in the AUTO condition. Steps 6.4 and 6.5 provided instructions to manually record data on the selected tape recorder channels. The procedure failed to specify which of 16 channels to record. Additionally, the procedure failed to specify that the AUTO/MANUAL switch had to be in MANUAL position for manual recording. The restoration of the recorder to automatic operation following manual operation was also not mentioned in the procedure.

Procedure OPGP03-ZE-00019 described the VLPMS program, including responsibilities, data collection requirements, periodic inspections and tests, and alarm response instructions. Section 8.0, "Alarm Response," provided detailed information on how to respond to the alarm LOOSE PARTS SYS TRBL located on Control Room Panel CP-009. The responses included notifying the shift technical advisor (STA), determining that the initial and subsequent alarms actuated, and recording data if necessary. Alarm Response Procedure 1POP09-AN-09M1 for this alarm (Location B-8) did not mention any of the requirements established by OPGP03-ZE-0019. The alarm response procedure, as a minimum, should have referenced OPGP03-ZE-0019, Section 8.0.

As a result of discussions with licensee personnel and through visual observations of VLPMS operation, the inspector noted that the system was not being maintained in its normal mode of operation. Normally, the system should be in the AUTO mode of operation. If an alarm was received, a first out indication light would energize, the Alarm B-8 on CP-009 would actuate, and the tape recorder would automatically start to record the alarmed channels. However, the licensee routinely left the VLPMS monitors in MANUAL mode of operation, which defeated the purpose of the AUTO functions. On the day of inspection, both the Unit 1 and Unit 2 VLPMS monitors/recorders were in MANUAL modes. The Unit 1 monitor had 10 of 16 alarms present and the Unit 2 monitor had 7 of 16 alarms present. Additionally, the loose parts locator printer was supposed to be in service with the OFF LINE and TEST buttons in the out positions. The Unit 1 printer was found without paper and with the OFF LINE button depressed in the IN position.

At the request of the inspector, the licensee placed the Unit 1 VLPMS system in AUTO mode of operation. Within minutes, the system automatically started up on a high vibration alarm. The system worked as designed: the first out indicator illuminated, the control room alarm actuated, and the tape recorder started. Apparently, the alarm, like all others previously actuated, was spurious and was not indicative of excessive vibration or loose parts. The system was then returned to MANUAL to reset the tape recorder tape position. The inspector questioned licensee personnel on the use and current condition of the VLPMS monitors. The inspector believed that the system was inoperable or incapable of performing its intended functions, for several reasons: the monitors were left in MANUAL, the recorder was not being utilized, the VLPMS sensor setpoints were apparently incorrectly established, and operations

personnel were not routinely responding to the VLPMS alarms. The licensee offered several comments regarding the system, including: (1) daily and weekly channel checks were being performed and if a loose part was present, it probably would be detected during these checks, (2) despite efforts to recalibrate the sensors, high background noises attributable to reactor coolant pump seals resulted in spurious alarms, (3) overall changes in alarm setpoints were being contemplated, and (4) the licensee was aware of the problem and was considering long-term solutions, including replacing the current VLPMS with a different system of detection.

System operability is described in FSAR Section 4.4.6.4 and RG 1.133. The FSAR specifically describes the system as operable in Modes 1 and 2. RG 1.133 states that the VLPMS systems should be maintained in the automatic mode for continuous, online detection of loose parts. Also, the manual mode is to be used only periodically, for testing loose parts, system calibration, channel checks, detecting trends, and diagnostic purposes. The operability of the VLPMS and the licensee's long-term corrective actions will be monitored by the inspectors. This is an open item (498;499/8941-01).

No violations or deviations were identified in this area of the inspection.

9. Installation and Testing of Modifications (37828)

Minor plant modifications were selectively inspected to ascertain whether the modification activities were in conformance with established procedures and regulatory requirements. The inspection consisted of direct observation of the modification work in progress, testing of the modifications following installation, and a review of the completed work packages. The three modifications inspected were on Unit 1. The modifications examined and reviewed included:

- ECNP No. 89-L-0011, Modification of 125 vdc power supply breakers
- ECNP No. 88-J-134, modification of the main turbine trip system cabinet power supplies, and
- ECNP No. 89-J-269, modification of the feedwater isolation valve control circuits

ECNP No. 89-L-0011 was developed to comply with a licensing commitment to the NRC. The modification consisted of changing the control power for a standby transformer 13.8 kv incoming breaker to a second power supply to maintain independence from offsite power sources. Two sources of DC power were required for independence from offsite power sources (the incoming breaker from Standby Transformer 2 would be separated from the power to the remaining incoming breakers) to meet the general design criteria of SRP (standard review plan) Section 8.2.1. The work consisted of disconnection and deletion of selected cables, removal and replacement of

several circuit breakers, installation of several new cables and one conduit, removal of transfer switches, and reworking three transfer switch panels. All work specified in ECNP 89-L-0011 was verified to be completed, the ECNP was reviewed, and no concerns were identified by the inspectors.

ECNP No. 88-J-134 was developed to provide two independent power supplies to the main turbine trip system cabinet in lieu of two power supplies from one distribution panel. This modification was in response to the licensee's program to minimize single component failure modes which could cause a trip of the main turbine or challenge the primary systems. This modification was designed to prevent a turbine trip due to the loss of a single non-essential inverter power circuit or a single turbine trip control circuit, thus enhancing the system reliability.

The work consisted of installation of a new branch switchboard unit, removal of fuses from one distribution panel (DP002) and placement in a second distribution panel (DP001), rerouting of a power supply cable, installation of a conduit, and rewiring two trip solenoid inverter cabinets. Portions of the installation were witnessed by the inspector while in progress and all modifications were verified correct per the ECNP instructions following installation completion. Several observations were reported to the licensee for corrective action, including: the incorrect cable code was noted on two EE580 cards (electrical termination installation cards); temporary test jumper connections were noted installed in the trip solenoid inverter cabinets that should have been removed following test completion; relays in the trip solenoid inverter cabinets were labelled differently on the drawings in the ECNP and on the relays in the field (for example, point "AC(Y)" on the documents was labelled "7" in the field); and the Local Panel DP001 nameplate had six revisions (plaques or tape over old names), required a seventh, but should have been replaced.

ECNP 89-J-269 was generated to add a relay to each Feedwater Isolation Valve (FWIV) control circuit. The modification was designed to prevent plant trips during partial closure tests at full power in the event of limit switch malfunctions. The modifications were made in response to Unit 2 LER 89-019. Unit 2 tripped off line when FWIV "C" unexpectedly fully closed during partial stroke testing.

The work consisted of relay panel modifications, installation of 4 new relays, adding wiring for the 4 new relays, and resetting the time settings on 4 other relays. The work was monitored and postmaintenance testing was witnessed. Observations made and reported to the licensee included: the postmaintenance testing requirements of the ECNP listed the wrong surveillance test, the ECNP required a change to reflect that different relay model numbers are used than those described in the engineering documents, and two relays were mislabelled. The relay labeling errors were subsequently corrected.

The modifications inspected were correctly implemented, postmaintenance testing was completed, and no safety concerns were identified.

No violations or deviations were identified in this area of the inspection.

10. Engineered Safety Feature System Walkdown (71710)

A complete walkdown of the ECW system for Unit 1 was performed to independently verify the status of this ESF system. The walkdown was performed in conjunction with Section 12 of this inspection report (plant startup following refueling outage) to independently ascertain whether the ECW system was returned to service in accordance with approved procedures. The inspection consisted of an operating procedure review, comparison of the operating procedure to plant drawings, and a complete walkdown of the system to verify whether the system was in a position to support plant operation. Specific items inspected in the field included determinations that: valve, switch, and breaker positions were correct, housekeeping was adequate, and support systems were in service.

A review of Operating Procedure 1POP02-EW-0001, "Essential Cooling Water Operation," Revision 8, was performed. The procedure lineups (valve, switch, electrical power supply positions) were compared to system piping and instrument diagrams (P&ID). Observations made in the technical review included:

- Two P&IDs were missing from the references section of the procedure (P&IDs 9F20005 No. 1 and 1F00032). The prerequisite section of the procedure did not ensure proper operation of support systems (such as instrument air).

- Numerous differences in the required positions of valves as shown on the P&ID and as listed in the valve lineups were identified. These position differences included normally open versus normally closed and locked full open versus locked in position (throttled). Additionally, some valves did not specify a required position on the P&ID. Butterfly valves on P&IDs require letter designators signifying their required position because all butterfly valves are drawn the same. These valves did not have letter designators specifying a required position. The affected valves included Train A (EW-0188, EW-0001, EW-0020, EW-0259, EW-0031, EW-0280, FV-6914, and FV-6935), Train B (EW-189, EW-0003, EW-0056, EW-0260, EW-0203, EW-0281, FV-6924, and FV-6936), and Train C (EW-0002, EW-0261, EW-0206, EW-0282, EW-0093, EW-0190, FV-6934, and FV-6937) valves of the ECW system. Two valves of the Essential Cooling Pond Makeup System, EP-0009 and EP-0010, were also affected.

- Typographical errors were observed in the procedure, including: the wrong power supply was listed for Screen Wash Valve FV-6924 (the procedure checklist (-2) listed FV-6924 power supply as DPB-135, but actually was DPB-335), and the name of Valve EW-0095 was incorrectly

called the Pressure Indicator PI-6892 isolation valve but actually was the PI-6898 isolation valve. Labelling discrepancies were observed. For example, Fan FN001 was named "1A ECW HVAC VENT FAN FN0001" in the procedure but was labelled "RM 105 FAN 11B" on Control Room Panel CP-022.

- Vent and drain valves are normally shown as normally closed valves on P&IDs with letter designators (such as "D" for drain) to identify what the valves are. The following valves were noted to be missing their letter designators: EW-216, EW-220, EW-0376, and EW-0377.

- Valve 1-EW-0367 was deleted from the system and the procedure checklist (-2) in accordance with FCR-2232, but the valve was not deleted from the vent checklist (-6). Valve EW-268 was deleted from the vent checklist (-6) in accordance with FCR 89-2507, but was not deleted from the valve checklist (-3).

A walkdown of the ECW system was performed, observations included:

- The identification tag for EW-0375A was badly rusted and could not be read. Valve EW-0139 was missing it's identification tag. The following pairs of valves were noted to be tagged in reverse in the field: EW-0235 and 0234, EW-0289 and -0290, EW-0237 and -0236, EW-0299 and -300, and EW-238 and -239.

- Several nonsafety-related components were found to be missing from the procedure checklists (but were in the correct position to support system operation): Distribution Panel DPA-335, Breaker No. 5, Train A Room Intake/Exhaust Air Dampers (ventilation power supplies supporting EW system were considered part of the system procedure); DPB-335, Breaker No. 5, Train B Room Intake/Exhaust Air Dampers; DPC-335, Breaker No. 5, Train C Room Intake/Exhaust Air Dampers; Valve EP-0011, ECW Sump Pump B Discharge Pressure Isolation; and Valve EP-0012, ECW Sump Pump A Discharge Pressure Isolation.

- The valves, EW-100 and EW-096, were deleted in the field but were still listed in the procedure checklist (-3). Several valves needed to be added to the valve checklists (valves added by addition of corrosion monitoring equipment) that were recently installed: EW-475 and EW-476.

- Several components were found in the incorrect position in the field. Valve EW-0369A, ECW Pump 1A Supplementary Lubricating Water Isolation, was found open but should have been shut (Train A was not in service at that time). A spare breaker, Breaker No. 3 at Distribution Panel DPA-335, was found ON but should have been OFF. Two power supplies (Motor Control Center E1A4, Cubicle F1, and Distribution Panel DPA-135, Breaker 7) were found OFF but should have been ON. The power supplies provided power to the Essential Chiller Condenser 12A outlet valve and associated servoamplifier. Two power supplies (Distribution Panel DPB-135, Breakers 7 and 8) were found

ON, but should have been OFF. The power supplies provided power to the Essential Chiller Condenser 11B and 12B outlet valve servoamplifiers. Although these components were incorrectly positioned, a safety concern did not exist. The power supplies to the essential chiller condenser outlet valves had been disconnected from the valves by a temporary modification, the spare breaker was not connected to any component, and the open valve would have simply supplemented the lubricating water flow to the ECW Pump 1A.

- A fire cabinet in Room 67E (essential chiller room) of the mechanical auxiliary building, Unit 1, was found open. An inspection of the cabinet identified a thick layer of spilled oil in the bottom of the cabinet. This condition was reported promptly to the Unit 1 operations manager for resolution.

- The cable guard on nonsafety-related Cable N1XM1ARX258 (connected to Chlorine Analyzer AE-6952) was pulled loose from an endpoint connection and was exposing the enclosed insulated conductors.

All items were reported to the licensee for resolution. The licensee stated the operating procedure was in the process of revision and the observations would be incorporated into the revised procedure. The observations made were not considered safety significant and none would have prevented the system from performing its intended function.

No violations or deviations were identified in this area of the inspection.

11. Nonroutine Reporting Program (90714)

An inspection was conducted of specific portions of the licensee's nonroutine reporting program to ascertain whether responsibilities have been assigned for review and evaluation of off normal operating events and whether vendor bulletins and circulars were reviewed for applicability and incorporation where appropriate. This inspection also included the controls for recognition of applicable events that are covered by 10 CFR Part 21. The following documents were reviewed in the course of this inspection:

- Interdepartmental Procedure IP-1.8Q, Revision 7, "Control of Vendor Documents"

- Interdepartmental Procedure IP-1.15Q, Revision 0, "STPEGS Reporting Program"

- Interdepartmental Procedure IP-1.03Q, Revision 1, "Reporting 10CFR21 Deficiencies to the NRC"

- Interdepartmental Procedure IP-1.45Q, Revision 4, "Station Problem Reporting"

- Interdepartmental Procedure IP-1.22Q, Revision 5, "Operating Experience Review"

The inspector determined that these procedures provided adequate controls for the following:

- Receipt, review, statusing, and distribution of vendor supplied design, technical, and QA documents applicable to this facility.
- Identifying and evaluating conditions which could possibly affect the safe operation of this facility.
- Reporting deficiencies, defects, and noncompliances to the NRC in accordance with 10 CFR Part 21.
- Ensuring that the reporting requirements applicable to the facility are effectively addressed.
- Establishing uniform requirements for the management and administrative controls for correcting conditions that may not conform to established requirements.
- Establishing a uniform method for the screening and review of industry and internally generated operating experience information.

The inspector performed an in-depth review of the licensee's Vendor Equipment Technical Information Program (VETIP) by verifying that selected bulletins had been incorporated into the following vendor manuals:

- Westinghouse Steam Turbine Manual - Volume II
- Cooper Energy Services Emergency Diesel Generator Service Manual

Additionally, the following bulletins were reviewed with respect to timeliness and incorporation:

- Westinghouse Bulletin 87-01
- Westinghouse Bulletin 87-01, Revision 1
- Westinghouse Customer Advisory Letter 89-03
- Foxboro Company Bulletin 89-01
- Johnson Controls (ITT/Barton) Bulletin 86-01

The inspector also reviewed licensee actions taken in response to a 10 CFR Part 21 Notification issued by Limitorque Corporation on November 3, 1988. This notification involved reported failures of Melamine torque switches in Limitorque supplied SMB-00 and SMB-000 valve actuators. The reported failures were determined to represent a common mode failure resulting from the postmold shrinkage of Melamine. Limitorque reported that SMB-000 actuators with serial numbers lower than 354839 and SMB-00 actuators with serial numbers lower than 233218 could have been supplied with Melamine torque switches. HL&P initiated a document search and determined that no SMB-00 actuators with serial

numbers lower than 233218 had been purchased. The search identified 13 SMB-000 actuators in Unit 1 and 11 SMB-000 actuators in Unit 2 with serial numbers lower than 354839. HL&P considered this to be a potential environmental qualification (EQ) issue because reference to time and temperature degradation of the Melamine switches was made in the notification. Therefore, the suspect torque switches were further reviewed to determine if any were utilized in EQ applications. This review disclosed that none of the suspect torque switches were installed inside either containment buildings and that only one switch was installed in the isolation valve cubicle (IVC) (a harsh environment) of each unit.

Maintenance work orders were written (AF-61299 and AF-62197) to inspect MOVs D1AFMOV0514 and D2AFMOV0514 in the Units 1 and 2 IVCs. The results of these inspections were that Melamine was not used in the torque switches for these two MOV actuators. The remaining suspect actuators were addressed by revising Procedure OPMP05-ZE-0300, "Limitorque MOV Motor Inspection and Lube," to include inspections for Melamine torque switches and replacement of any Melamine with Fiberite torque switches. The remaining 22 actuators identified in the Part 21 notification were reviewed. Thirteen of the valves were butterfly valves which do not use a torque switch, 4 were rad monitor system ball valves which do not use a torque switch, 2 were chilled water systems valves which had been deleted from the system, and the remaining 3 valves were inspected as part of routine preventative maintenance and verified as not having Melamine. This procedure is applicable to all MOV actuators during their scheduled preventive maintenance and, therefore, represents a search program not limited to the actuators identified in the Part 21 notification. The licensee's decision to inspect all MOV actuators proved prudent in that, during the application of this procedure, one SMB-00 actuator, outside the scope of the Part 21 notification (Serial No. 339924), was identified as having a Melamine torque switch. The valve in question was part of the chemical volume & control system (CVCS) and was not located in a harsh environment. A problem report was issued and the switch was replaced. Further investigation was inconclusive as to whether the valve actuator was originally provided with a Melamine torque switch by Limitorque. To preclude the use of Melamine torque switch usage, inspections were made of the spare parts and components located in both the HL&P and Bechtel warehouses. No other Melamine torque switches were found. Additionally, the restricted components list (Specification 5A23HGS0001) was revised to prohibit the purchase or use by any supplier of any Limitorque motor operators utilizing Melamine torque switches.

This inspection determined that the licensee's programs were effective and were being implemented in conformance with requirements.

No violations or deviations were identified in this area of the inspection.

12. Plant Startup from Refueling (71711, 61705, and 61707)

Following the Unit 1 refueling outage and prior to unit startup, an inspection was performed to ascertain whether systems disturbed during the outage were returned to an operable status and to determine if the plant startup and core physics tests were conducted in accordance with approved procedures. The inspection consisted of observation of control room activities, plant walkdowns of two systems worked on during the outage, and witnessing of selected tests. Control room activities were inspected to ensure that the startup procedures and plant personnel adhered to TS and procedural requirements. The safety-related portion of the feedwater (FW) system and the entire ECW system were walked down. The systems were inspected to ensure that they were returned to service in accordance with plant procedures following disturbance during the outage. Additionally, the performance of three surveillance tests and one temporary procedure was witnessed to ensure that they were performed correctly and the requirements of TS were met.

The safety-related portion of the FW system was inspected to verify that the system was correctly lined up to support plant operation. The FW valve checklist, 1POP02-FW-0001-4, Revision 5, was compared to the system P&IDs and to the as-found positions in the plant. All valves were noted to be in the correct positions to support plant operation. Several observations were made that were reported to the licensee for resolution. For example, Valve FW-0625 was incorrectly labelled FN-0625 on P&ID 5S139F00063-1, Revision 13, "Feedwater System." The hydraulic skid for Isolation Valve FV-7143 had three meters with damaged faceplates. Valve 1-FW-0576 was found in the checklist for safety-related valves, but 1-FW-0576 was nonsafety-related. The ECW system was also inspected in detail. The results of the ECW inspection are discussed in Paragraph 10 of this inspection report.

The procedures that were witnessed and reviewed by the inspector included (all observations were reported to the licensee for resolution):

- OPSP10-DM-0001, "Rod Drop Time Measurement," Revision 1
- OPSP10-ZG-0003, "Shutdown Margin Verification - Modes 3, 4, and 5," Revision 4
- OPSP03-NI-0001, "Daily Power Range NI (Nuclear Instruments) Channel Calibration," Revision 2
- OTEP07-MS-0002, "Main Steam Power Operated Relief Valve Inservice Operability Test," Revision 0

Procedure OPSP10-DM-0001 was performed to ensure that all shutdown and control rod drop times were in accordance with TS (less than or equal to 2.8 seconds). The licensee's biennial review of the procedure was performed late. The review should have been completed by June 23, 1989, but was actually completed in October 1989. This was previously identified by the

licensee and was documented in SPR 89-0610. Step 5.13 instructed the operator to open lift disconnect switches for rods not being tested. There were no steps in the procedure to ensure that switches opened were reclosed. Two steps were missing from the procedure, requiring data to be recorded at Rod Position "0." Step 5.28 refers the test performer to an incorrect addendum number. The note prior to Step 5.28.1.3 permitted the use of a capacitor without specifying what size capacitor to use. The acceptance criteria, Step 6.1, quoted Section 3.1.3.4 of TS, but the step did not list all information provided in TS 3.1.3.4 (specifically, the minimum temperature and number of reactor coolant pumps required to be operable were not listed). The incomplete acceptance criteria had no effect on the final test results. All acceptance criteria reviewed by the inspector met TS requirements.

The licensee performed Procedure OPSP10-ZG-0003 to determine the shutdown margin and to verify the shutdown margin present was within the requirements of TS. No specific concerns were identified with this procedure.

The licensee performed Procedure OPSP03-NI-0001 to determine, and readjust if necessary, the power range nuclear instrument channels. This test was performed to meet TS surveillance requirements. Section 2.0, "Test Equipment," included the use of a barometer, if available, to measure atmospheric pressure. Step 6.1.7.5 required the barometric pressure to be taken and recorded on the data sheet, or to use a standard value of 14.7 psia if a barometer was not available. Two barometers were onsite and were available for use, but the standard value was used instead. The procedure allowed the use of computer generated facsimiles to be substituted for the applicable forms contained in the procedure. The computer generated forms were similar to the ones in the procedure, but some of the columns for data recording were missing. Calculation sheet (-4) was missing the "Flow Nozzle Differential Pressure" column and the calculation sheet (-5) was missing the "Steam Generator Saturated Fluid Enthalpy" column. Neither of the missing columns had any effect on final results or acceptance criteria. Step 6.1.7.3 instructed the test performer to record feedwater temperature three times. The wording of the step did not clearly specify that four temperature readings were to be recorded three times (Steps 6.1.7.1 and 6.1.7.2 were more specific).

The licensee performed Procedure OTEP07-MS-0002 to verify that the main steam power operated relief valves (PORVs) would operate under full steam pressure and flow. This temporary procedure was written in response to a Justification for Continued Operation (JCO) concern on potential inadequate thrust to open the steam generator PORVs. Three page numbers on the table of contents page were incorrect. The procedure required stationing an operator outside the building housing the PORVs to quickly respond in case a PORV failed to close. The test was performed with the operator inside the building, observing the valve. The note prior to Step 5.3 stated that procedure Sections 5.6, 5.7, 5.8, and 5.9 could be performed in any order. Section 5.9 was missing a step (allow plant to return to steady state

conditions following PORV testing) that was present in the other three in the other three sections. The missing step suggested that Section 5.9 should have been performed last.

No violations or deviations were identified in this area of the inspection.

13. Exit Interview (30703)

The inspectors met with licensee representatives (denoted in paragraph 1) on November 1, 1989. The inspectors summarized the scope and findings of the inspection. The licensee did not identify as proprietary any of the information provided to, or reviewed by, the inspectors.