

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report: 50-498/89-22
50-499/89-22

Operating Licenses: NPF-76
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: July 10-14, 1989

Inspectors: *D. M. Hunnicutt* 7/27/89
D. M. Hunnicutt, Senior Project Engineer
Project Section D, Division of Reactor
Projects Date

[Signature] 8/16/89
L. Kelly, Reactor Inspector, Test Programs
Section, Division of Reactor Safety Date

Reviewed: *[Signature]* 8/16/89
J. E. Gagliardo, Chief, Operational Programs
Section, Division of Reactor Safety Date

Approved: *[Signature]* 8/31/89
E. J. Holler, Chief, Project Section D
Division of Reactor Projects Date

Inspection SummaryInspection Conducted July 10-14, 1989 (Report 50-498/89-22)

Areas Inspected: Routine, unannounced inspection of followup, review and evaluation of licensee event reports (LERs), licensee action on previously identified inspection findings, and an enforcement action package.

Results: Within the areas inspected, no violations or deviations were identified. The licensee's corrective actions including design changes, procedure preparations and revisions, equipment modifications, component and equipment installations, and testing were appropriate and had been completed to resolve nine LERs, enforcement action package (EA 88-216), one notice of violation (NOV), two open items, and one deviation. The licensee has shown significant improvement in the reduction of their backlog of LERs during the last 6 months.

Inspection Conducted July 10-14, 1989 (Report 50-499/89-22)

Areas Inspected: Routine, unannounced inspection of followup, review and evaluation of licensee event reports (LERs), and licensee action on previously identified inspection findings.

Results: Within the areas inspected, no violations or deviations were identified. The licensee's corrective actions including design changes, procedure preparations and revisions, equipment modifications, component and equipment installations, and testing were appropriate and had been completed to resolve nine LERs and one NOV.

DETAILS1.0 Persons ContactedHouston Power & Light Company

- *R. W. Chewing, Vice President, Nuclear Assurance
- *M. R. Wisenburg, Plant Superintendent
- *W. H. Kinsey, Plant Manager
- *J. E. Geiger, General Manager, Nuclear Assurance
- *M. A. McBurnett, Licensing Manager
- *V. A. Simons, Plant Operations Support Manager
- *T. J. Jordan, Plant Engineering Manager
- *S. M. Dew, Manager, NPMM
- *W. S. Blair, Manager, Maintenance Support
- *M. H. Carnley, I&C Manager
- *C. A. Ayala, Supervising Licensing Engineer
- *A. Khosla, Senior Licensing Engineer

NRC

- *J. I. Tapia, Senior Resident Inspector

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 July 14, 1989.

2.0 Licensee Action on Previous Inspection Findings - Unit 1

The inspector reviewed the actions taken by the licensee regarding the following previously identified inspection findings.

2.1 Violations - Deviations (92702)2.2 (Closed) Violation (EA 88-216) - Falsification of Fire Watch Logs - Unit 1 and Unit 2

NRC Investigation Report 4-88-004, dated December 5, 1988, documented an investigation into the falsification of fire watch logs at STP. A Notice of Violation was issued as a result of this investigation.

The results of the investigation revealed that between December 6, 1987, and January 23, 1988, a fire watch supervisor and two fire watch personnel initialed fire watch logs indicating they had passed through the required areas once in every 60-minute period when, in fact, they had not done so.

The inspector reviewed the licensee corrective actions outlined in STP Response ST-HL-AE-2925 to the Enforcement Action 88-216 dated December 5, 1988. Items selected for review included:

- ° The retraining outline and training attendance records were reviewed. In addition, the revised General Employee Training (GET) was reviewed.
- ° The revised fire watch scheduling was reviewed, which included shorter hours and increased supervisory monitoring.

The inspector has no further questions regarding this issue. This item is considered closed.

2.1.3 (Closed) Violation (498/8870-03) - Failure to Adequately Record Heat Numbers

It was noted by the inspector during the review of repair and replacement Traveler R&R 1-88-019, that Steps 1B and 1D did not contain an adequate record of material identification markings as required (i.e., only the material specification markings were recorded for the majority of the studs and the heat numbers were omitted).

The inspector reviewed the licensee corrective action outlined in STP Response ST-HL-AE-2980 to the violation.

The licensee stated that although the heat numbers were not recorded properly, the traveler in question and the maintenance work request (MWR RH57765) provided adequate traceability. The licensee also stated that mechanical maintenance personnel were not completely familiar with ASME material marking conventions. Training was provided to the mechanical maintenance personnel related to ASME Section XI requirements with emphasis on proper material identification and distinguishing of heat numbers and material markings. A review of training records indicated that the mechanical maintenance craft personnel attended the required training. The inspector had no further questions regarding this issue. This item is considered closed.

2.1.4 (Closed) Deviation (498/8726-04) - Failure to Establish a Record Index Prior to Records Receipt

The licensee had committed, in the STP Final Safety Analysis Report, to the provisions of Regulatory Guide 1.88 and ANSI N45.2.9-1974, which requires that an index be established for quality records prior to their receipt of records into the storage facility.

Contrary to this requirement, several classes of quality records were receipted into the Operations Document Control Center (ODCC) prior to their inclusion in the STP Document Type List (DTL).

The inspector reviewed the licensee's response, which included an inventory of the ODCC and update of the DTL. Additionally, the licensee identified and included in the DTL, records that will be generated in the future. Procedure IP 1.31Q, "Interdepartmental Procedures System," was revised to require input to the DTL for new or revised records.

The inspector had no further questions regarding this matter. This item is considered closed.

2.2 Open Items (92701)

2.2.1 (Closed) Open Item (498/8739-10) - Correction of Annunciator Set-points

The inspector identified several safety-related annunciator set-points that were based on the January 1986 edition of Technical Specifications vice the Final Draft dated May 18, 1987. The five set-points were identified to the licensee with the concern that there may be other set-points that could be in error.

The inspector reviewed the licensee's actions and determined that the specific errors had been corrected and that a Technical Specification set-point verification had been performed.

The inspector had no further questions regarding this matter. This item is considered closed.

2.2.2 (Closed) Open Item (498/8750-03) - Inadequate Identification or Protection of Significant Alarms or Controls

A reactor operator, during routine checks of equipment in the control room for Unit 1, noted that both unit vent radiation monitors were in alarm. Both sample pumps had been deenergized for about 6 hours. The operators were unaware of this condition, therefore, no samples were taken as required by Action Statement 53 of Technical Specification (TS). The condition was identified by the licensee and prompt corrective action was taken.

The inspector had concern that other plant equipment, alarms and controls that have safety or TS significance would not in all cases be clearly identified and/or protected from inadvertent activation or deactivation. The licensee committed to review the plant from a human engineering standpoint for plant conditions where inadequate identification of significant alarms, controls, and physical protection of switches exists.

The licensee had completed the review and where there were inadequate identification of alarms and controls noted, they were corrected. In addition, areas where the possibility of activation or deactivation by bumping or tripping was identified, the condition was corrected.

The review appeared to be thorough and the corrective action adequate.

The inspector had no further questions. This item is considered closed.

3.0 Onsite Followup of Written Report of Nonroutine Events at Power Reactor Facilities - Unit 1 (92700)

(Closed) LER 88-10: "Inoperability of Reactor Coolant Pump Seal Injection Containment Isolation Valves" - Unit 1

On September 23, 1987, the licensee discovered that the charging header pressure indicator (PI) was reading 1000 psi more than the local process pressure gauge. Maintenance work request (MWR) CV-8702 7620 was prepared. When the shift supervisor reviewed and approved the MWR, he failed to recognize that the PI could not properly indicate low header pressure. Failure of the PI to indicate low header pressure would result in the inoperability of the PI loop (containment isolation valves) which would violate TS 3.6.3. Based on the as found calibration data taken in response to the MWR, the setpoint of 400 psi would not have been reached on decreasing pressure. This would have prevented automatic closure of the four reactor coolant pump seal injection containment isolation valves (RCSICIV) upon a containment isolation phase A signal coincident with low charging header pressure. The technician working with the MWR could not calibrate the transmitter. The licensee determined that the transmitter should be replaced. Licensee personnel did not realize that the outboard containment isolation valves (CIV) on the reactor coolant pump seal injection (RCPSI) piping system could be affected. CIV operability is required for plant operating Modes 1 through 4. Unit 1 entered Mode 4 on October 31, 1987. On January 26, 1988, with Unit 1 in Mode 4 prior to initial criticality, the licensee discovered, during a technical specifications (TS) surveillance review meeting, that the charging header pressure instrumentation loop did not have surveillance requirements with respect to containment isolation. A replacement transmitter was installed, tested, and placed in service. The charging header pressure instrumentation loop was retested successfully. The PI loop was declared operable on January 28, 1988.

The licensee determined the cause of the event was an ineffective program for generation and approval of MWRs. The guidance provided to the shift supervisor was insufficient for him to make decisions relative to equipment operability. A contributing factor was that the charging header pressure instrument loop was not identified in the TS.

A Severity Level IV violation (50-498/8809-14) was issued to the licensee. This Notice of Violation (NOV) was issued because the corrective actions did not appear to have been fully effective in precluding failures to meet surveillance requirements. The NOV was closed in NRC Inspection Report 50-498; 499/88-55. No additional action was necessary.

The licensee's revised corrective actions included: (1) an evaluation of the program for generation and approval of MWRs, (2) required reading for operator requalification training (Course No. 801, LER 88-10; attendance sheets verified training was completed), (3) submission of a proposed TS amendment to add the low charging header pressure instrumentation loop operability for limiting conditions of operation (LCO) and surveillance requirements, (the NRC approved the TS changes for paragraphs 3.4.9.3 and 4.4.9.3.1.d and bases 3/4.4.9 and 3/4.4.14 in Amendment No. 4) and (4) revision of 4 surveillance procedures:

- ° OPGP03-ZM-0003, "Maintenance Work Request Program." Changed step 4.12.3 to require the work start approval authority review of the work scope does not affect the TS.
- ° OPGP03-ZE-0004, "Plant Surveillance Program." Required that the divisional surveillance coordinators periodically review upcoming tests and ensure that the test packages are received by the starting date. The revisions should assure that the actuation function is consistent with other engineered safety features (ESF) functions and satisfies the TS requirements.
- ° OPGP03-ZE-0005, "Plant Surveillance Procedure Preparation." Required the writer to ensure that available information used to document the entire circuit is reviewed.
- ° OPGP03-ZE-0021, "Inservice Testing Program for Valves." Established controls to review implementing procedures when new revisions are issued.

The inspector verified the readings on the local process pressure gauge, observed that the PI would properly indicate low header pressure, reviewed the calibration data for the PI, reviewed the charging header pressure instrumentation loop retest information, and reviewed the licensee's cause and evaluation of the event. The inspector found no discrepancies in the licensee's replacement of components, retest, or evaluation of this event. The inspector agreed with the licensee's findings and revised corrective actions.

This item is closed.

(Closed) LER 88-41: "An Inoperable Toxic Gas Analyzer Due to a Wiring Error" - Unit 1

On July 10, 1988, with Unit 1 in Mode 1, a high toxic gas alarm occurred without an automatic actuation of the control room ventilation system. Control room personnel placed the ventilation system into recirculation mode and verified the damper lineup. Investigation by the licensee determined that the alarm resulted from one analyzer displaying a continuous high concentration of hydrochloric acid (HCl), while the other analyzer showed normal readings. The affected analyzer was flushed and zeroed with zero sample gas (ambient air). The toxic gas analyzer was

returned to normal operation. No personnel were working in the vicinity of the analyzers when the event occurred. An investigation by the licensee of the failure of the ESF revealed that a wiring error (relay K-15 was bypassed) prevented actuation of the control room ventilation to recirculation mode from a high toxic gas analyzer reading or alarm. The wiring error was corrected by relanding a wire on relay 15 as required by MWR HE 45461 and HE 59847 and Change Control Package (CCP) 1-J-FST-0555. The toxic gas analyzer was tested successfully and returned to service. This item is closed.

(Closed) LER 88-54: "Control Room Ventilation Actuation to Recirculation Mode Due to a High Ammonia Trip on a Toxic Analyzer" - Unit 1

On September 21, 1988, with Unit 1 in Mode 1, an automatic actuation of the control room ventilation to recirculation mode occurred. The actuation resulted from a high trip of the ammonia channel on one of the two toxic gas analyzers. The licensee determined that the ESF actuation was caused by a momentary high level reading. Ammonia fumes being produced from a transfer of condensate polishing system waste to the neutralization basin was the most likely cause of the high level reading. There were no other plant operations in progress that could have caused the trip on the ammonia channel. There were no plant personnel working on or around the toxic gas analyzers at the time of the occurrence. The monthly surveillance test was successfully performed on the analyzer. No evidence was found to suggest an analyzer failure. The licensee performed a revised analysis and submitted a request to increase the TS limit for a high level ammonia trip from 5 parts per million (ppm) to 25 ppm to the NRC on March 8, 1988. The TS change (3.3.3.7) for ammonia set points was approved by NRC. The licensee reset the ammonia setpoints (Work Request (WR) HE-80620, dated April 21, 1989) in Units 1 and 2 to 22 ppm which is 3 ppm below the approved maximum setpoint of 25 ppm. This item is closed.

(Closed) LER 88-59: "Inadvertent Actuation of a High Head Safety Injection Pump Due to Operator Error" - Unit 1

On October 6, 1988, with Unit 1 in Mode 3 (reactor coolant temperature 450°F and 912 psig), testing of the outboard check valves of the safety injection (SI) system pressure isolation check valves was required. Train A check valves had been tested and testing of Train B was in progress. The cause of this event was a licensed operator starting the Train C high head SI pump instead of the low head SI pump by mistake. The Train C high head SI pump discharge head was greater than the primary system pressure during the test. Water was injected into the reactor vessel for about 1 minute. The SI resulted in a pressurizer level increase of 15 percent or about 2000 gallons of borated water.

The licensee determined the cause of this event to be an error on the part of a licensed operator. The operator inadvertently operated the wrong pump control switch. Surveillance Procedure 1PSP03-SI-0023, "Safety Injection System (SIS) Pressure Isolation Check Valve Leak Test,"

contained explicit instructions to start the low head SI pump. The licensee held shift briefings for plant operators to review this event and to emphasize the need for verbatim procedure compliance. This item is closed.

(Closed) LER 88-64: "Failure to Perform the Weekly Battery Surveillance Test on Battery E1D11" - Unit 1

On December 5, 1988, with Unit 1 in Mode 3, the licensee discovered, by personnel reviewing surveillance packages on December 5, 1988, that the weekly battery surveillance test was not performed on December 2, 1988, as required for a change from operating Mode 5 to Mode 4. The battery surveillance test was performed satisfactorily on December 5, 1988. The licensee determined that the failure to complete this surveillance prior to the mode change was caused by a personnel error. The licensee instructed the maintenance surveillance coordinators on the operation of the surveillance data base and the use of the Mode Change Report. Coordinators were instructed not to sign off on a Mode Change Report until it had been confirmed that the required tests had been satisfactorily completed. This item is closed.

(Closed) LER 89-01 "Reactor Trip on January 3, 1989, Due to Turbine Controller Failure" - Unit 1

On January 3, 1989, with Unit 1 in Mode 1, a reactor trip occurred on an over temperature/delta temperature signal. The signal was generated in two of four reactor coolant loops when the main turbine/generator electro-hydraulic control (EHC) system which closes the turbine governor valves failed. The licensee could not determine the cause of the EHC failure. The failure was attributed to a degraded interconnecting wire (+15V DC). This degraded wire, which had burned insulation, permitted a drop in power supply voltage to six of eight printed circuit card frames and resulted in spurious signals in the digital logic circuits. The licensee's corrective actions included replacing the power supply interconnecting wire (card rack 1A09 TSZ Term 6). The other seven power supply wires were checked for excessive voltage drop. The voltages in these seven power supply wires were normal. This item is closed.

(Closed) LER 89-07: "Failure to Perform a Surveillance Test Due to Personnel Error" - Unit 1

On February 8, 1989, with Unit 1 in Mode 5, the licensee determined that the monthly analog channel operational test for the gaseous waste processing system (GWPS) oxygen analyzer had exceeded its allowed surveillance interval and grace period on February 5, 1989. The GWPS had been in operation for the period of February 5-8, 1989, in violation of the LCO for TS 3.3.3.11. The licensee determined that the cause of this event was failure of I&C maintenance personnel to perform the surveillance prior to exceeding the surveillance grace period. Operations procedure OPGP03-ZA-0063, "Plant Operations Shift Turnover" had been revised (added paragraph 3.2.3, Revision 7) to require the shift supervisor's

daily review of the report of surveillances that have reached the end of their respective grace periods. This event and its consequences were discussed in training during the scheduled training cycle. This overdue surveillance report was included in the work control center daily agenda to ensure that personnel are allocated to support timely completion of surveillance testing. A Severity Level IV violation (50-498/8904-01) was issued to the licensee as a result of this failure to perform a surveillance test. The licensee has responded to the NOV. The NRC has reviewed the licensee's reply and found it responsive to the concerns raised in the inspection report. The inspector will review the implementation of the corrective actions during a future inspection. This item is closed.

(Closed) LER 89-09: "Failure to Perform a Technical Specification Required Post Maintenance Test on a Containment Isolation Valve" - Unit 1

On March 3, 1989, with Unit 1 in Mode 1, the licensee discovered that the reactor coolant system (RCS) primary sampling system outside containment isolation valve had not been tested for proper stroke (valve opening and/or closing) time following a work activity as required by TS. The contractor work request (CWR) 004309 which controlled the work activity included requirements for a post maintenance leak rate test. The CWR did not specify that a stroke time test was required by TS. The valve was stroked when the licensee identified that the required TS requirement had not been met. The valve met the stroking time requirements.

An inadequate licensee review of the operability tracking log for items that would prevent an operating mode change contributed to this event. The licensee's corrective actions included implementation of an enhanced work process program which clearly identified the responsibilities of the engineering, operations, and maintenance departments in the specification for post maintenance testing to meet TS requirements. Night orders were issued to operating crews. These orders reinforced the need to ensure that entries in the operability tracking log are in accordance with procedure. This event and its consequences were discussed in control room operators training during the scheduled training cycle. The operations procedure (OPOP01-ZQ-0030, "Maintenance of Plant Operations Logbooks") for maintenance of control room logs was revised (Revision 7) to include enhanced instructions for the maintenance of the operability tracking log. This item is closed.

(Closed) LER 89-10: "Failure to Perform Post Maintenance Testing of a Charging Pump Recirculation Valve Due to a Personnel Error" - Unit 1

On March 27, 1989, while Unit 1 was in Mode 1, the licensee performed a review of a completed CWR (No. 005066). This CWR required a packing adjustment to the centrifugal charging pump 1B recirculation valve. The licensee discovered that a post maintenance stroke time test required by American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, and TS 4.0.5 had not been performed on centrifugal charging pump 1B recirculation valve 1-CV-FV-0202. The stroke

time test was successfully completed. The licensee's investigation determined that the valve and system were not declared inoperable and entered in the operability tracking log for tracking of the LCO of TS 3.1.2.4. The CWR included a clear requirement to perform a valve stroke time test upon completion of the work. The CWR stated that the work included a valve packing adjustment. Procedure OPGP03-ZM-0003, "Maintenance Work Program," steps 4.8.10 and 4.12.18 specified actions necessary to properly complete maintenance activities.

The licensee determined that the cause of this event was a personnel error. Start of the work was approved on a CWR which rendered a TS required system inoperable without entering the condition in the operability tracking log. This omission resulted in an inability to track the restoration and testing of the valve within the action statement time limits. The corrective actions included issuance of night orders to emphasize the importance of the operability tracking log and the need to follow procedure when completing the log. This event and its consequences and a review of the operability tracking log maintenance were discussed in control room operators training during the scheduled training cycle. Corrective actions were identified to improve the work control process program. This recently developed program uses a work order to identify and track physical work required to complete a maintenance activity. A separate post maintenance test package is utilized to define the scope and responsibilities for testing and to schedule required testing to support TS requirements. This item is closed.

4.0 Licensee Action on Previous Inspection Findings - Unit 2 (92701)

4.1 Violations and Deviations

4.1.1 (Closed) Violation (499/8908-01) - Failure to Adequately Control and Identify Visitors

During a plant tour on March 6, 1989, the inspector noted a visitor to the plant, in the fuel handling building, without a visitor badge. The badge was attached to the visitor's jacket, which had been left on the floor. The visitor's escort was with the visitor, however, the inspector noted that the failure to properly display the visitor badge was contrary to Station Procedure OPGP03-ZS-0001, "Personnel Access Control."

The inspector reviewed the licensee's actions in response to this violation. These actions included:

- Writing an Individual Access Transaction Report describing the incident.
- Checking for any unauthorized key card usage.
- Reinstrucing security personnel.

- ° Supplying "breakaway" chains so that the badges can be worn around the neck.

The inspector had no further questions concerning this issue. This item is considered closed.

4.1.2 (Closed) Violation (EA-88-216) - Falsification of Fire Watch Logs

For details of this item, refer to paragraph 2.1.2 of this report.

5.0 Onsite Followup of Written Report of Nonroutine Events at Power Reactor Facilities" - Unit 2 (92700)

(Closed) LER 89-03: "Partial Loss of Offsite Power Due to a Defective Overcurrent Relay" - Unit 2

On February 3, 1989, Unit 2 was in Mode 5 prior to initial criticality. A partial loss of offsite power occurred on the 4.16 kilovolt (KV) ESF Train C bus. The Train C standby diesel generator (DG) started and loaded as required. The ESF transformers are nonsafety-related 13.8 KV to 4.16 KV transformers which connect offsite power from the 13.8 KV auxiliary system to each of the three 4.16 KV busses. The licensee's investigation determined that the bus undervoltage, ESF transformer differential, and ESF transformer lockout relays had actuated on Train C. Diagnostic tests confirmed that the transformer was not the source of the actuation. The cause of this event was apparently a manufacturing defect in the Train C ESF transformer differential relay (Model No. ITE87T). The licensee dismantled the defective relay and found that on the internal current transformer with primary winding corresponding to terminations 5 and 6 that a secondary lead had been wrapped loosely on a post on the printed circuit (PC) board. The secondary lead had not been soldered in place. The licensee installed a new relay as required by MWR No. PK-73835. The Train C ESF transformer was tested and placed back in service. This item is closed.

(Closed) LER 89-04: "Unplanned Initiation of Fuel Handling Building Exhaust Filtration Due to Radiation Monitor Actuation" - Unit 2

On February 6, 1989, Unit 2 was in Mode 5 prior to initial criticality. Radiation Monitor AIRA-RT-8035 (Spent Fuel Pool Exhaust Monitor) on the fuel handling building (FHB) exhaust air duct went into high alarm. The FHB heating, ventilating, and air conditioning (HVAC) system actuated to the filtered exhaust mode. Three alert alarms were received from the same monitor during the next 3½ hours. The high alarm and three alert alarms occurred on only one radiation monitor. No high radiation alarms had been received from this radiation monitor prior to this event and none had been received between February 6 and July 10, 1989.

The licensee sampled the FHB atmosphere. The analysis of the FHB atmospheric sample identified the presence of lead (Pb-214) and bismuth (Bi-214). Pb-214 and Bi-214 are naturally occurring, short

half-life daughters of radon-222. The concentrations of these isotopes were below the radiation monitor's high alarm and alert alarm setpoints (the alert alarm setpoint is set a factor of 10 below the high alarm setpoint). A redundant radiation alarm, which sampled the same HVAC duct did not alarm. The radiation monitor which initiated the actuation was checked for proper operation. The accuracy of the monitor was confirmed by a calibration check. The record of measured radioactivity, which was retrieved from the radiation monitor's computer, gives hourly average activity. A review of this record did not identify an increase in the measured activity for the time period (February 6, 1989, between 3:34 p.m. (CDT) and 6:51 p.m. (CDT)). It was unlikely that activity from Unit 1 was drawn into the Unit 2 FHB because Unit 1 had been shutdown for about 17 days, there had been no significant release reported from Unit 1, and the wind direction on February 6, 1989, would have blown a Unit 1 release away from Unit 2. The cause of this event is unknown. Both radiation monitors were verified to be operable and within calibration. This item is closed.

(Closed) LER 89-06: "Failure to Perform Technical Specification Required Post Maintenance Testing of an Actuation Due to Personnel Error" - Unit 2

On March 22, 1989, with Unit 2 in Mode 2, a review of a completed work document which replaced a solid state protective system (SSPS) turbine trip actuation relay was conducted. The licensee discovered that the post maintenance test, which had been performed on March 13, 1989, was inadequate to satisfy TS surveillance testing requirements. The turbine trip actuation relay was found to be inoperable during a surveillance test due to an open coil. MWR No. SP-75334 was prepared. The failed relay was replaced. The testing instructions did not include steps to verify operability of the relay contacts as well as the coil. The licensee determined that the root cause of this event was personnel error. A contributing cause was inadequate procedural requirements for independent review of post maintenance testing instructions during nonroutine corrective maintenance. The licensee performed the following corrective actions: (1) tested the turbine trip actuation relay successfully, (2) briefed maintenance supervisors on the requirements to obtain an independent technical review prior to implementation of post maintenance testing following corrective maintenance, (3) completed training of maintenance personnel on "Inadequate Post Maintenance Test (PMT) During Non-Routine Corrective Maintenance" (Course Attendance Records for April 12-20, 1989), and (4) included requirements for independent review of changes to work instructions and post maintenance testing instructions in an enhanced work process program (Procedure OPMP02-ZG-0005, "Work Planning," Revision 0) which was implemented on April 10, 1989. This item is closed.

(Closed) LER 89-07: "Inoperable Toxic Gas Analyzer Due to Personnel Error During Troubleshooting" - Unit 2

On March 22, 1989, with Unit 2 in Mode 2 for low power physics testing, a technician discovered an interconnecting wire (jumper) on the control room

inlet toxic gas analyzer. This jumper bypassed the high chemical level ESF actuation function of the control room HVAC system. The inoperable contact position did not affect control room HVAC isolation dampers. The licensee determined that this jumper had been installed during troubleshooting prior to March 7, 1989, and resulted in a violation of TS 3.3.3.7. The cause of this event was personnel error. Corrective actions included removal of the jumper (removed as specified in MWR No. 78929), revisions to maintenance work control procedures, issuance of a plant bulletin (NPOD BULLETIN No. 66, "Configuration Discrepancies," dated April 28, 1989) to stress the need to identify and evaluate configuration discrepancies, and training (Course Attendance Records for Course LER 89-007/SPR 890208, May 9-30, 1989) of maintenance personnel. This item is closed.

(Closed) LER 89-09: "Reactor Trip and Loss of Offsite Power Due to Incorrect Protective Relay Wiring" - Unit 2

On April 5, 1989, with Unit 2 in Mode 1, the licensee performed initial synchronization of the main generator to the electrical grid. While performing the initial synchronization to the grid, a reactor trip occurred due to loss of power to all four reactor coolant pumps (RCP). The loss of electrical power occurred when breaker pole failure relay 61/G1 sensing a failure of the C phase breaker pole, actuated tripping lockout relay 86BF/G1, pilot wire relay PM23 (primary), and lockout relay 86SY. Relay PM23 tripped pilot wire relay PM13 (primary and secondary) in the 345 KV switchyard. These relays resulted in a trip of the 345 KV switchyard breaker pole failure relay, two 345 KV switchyard breakers, the main generator circuit breaker, the main generator exciter field breaker, the main generator voltage regulator, the main turbine, and the 13.8 KV feeder breakers to the 4 auxiliary busses. The loss of power to ESF bus E2A caused standby DG No. 21 to start. ESF bus E2A loads sequenced onto the bus as required. The non-ESF balance of plant (BOP) DG failed to start automatically and could not be started manually.

The licensee's investigation determined that a jumper was missing between two terminals of main generator backup distance relay 21/G1 in the main generator protection circuit. This resulted in an open circuit on the phase C current transformer of the protection circuit. An additional wiring error on another relay (46/G1) in the main generator protection circuit was discovered.

The cause of this event was improper implementation of changes to the wiring of the main generator backup distance relay (21/G1) and negative phase sequence relay (46/G1) by startup technicians prior to turnover of the main generator system to Plant Operations. The licensee could not find a cause for the BOP DG failure to start. Subsequent starts were performed successfully on the BOP DG. This item is closed.

(Closed) LER 89-10: "Shutdown Bank Withdrawal in Violation of Technical Specifications Due to Personnel Error" - Unit 2

On April 8, 1989, Unit 2 was in Mode 3. A licensed operator identified that one channel (NI-0045) of the extended range neutron flux monitor had been out of service when the control rod shutdown banks were withdrawn on April 7, 1989. This was a violation of TS 3.3.1. The licensee determined that the cause of this event was personnel error by a licensed operator when he completed the operability tracking log to track the inoperable neutron flux monitor. An inadequate licensee review of the operability tracking log contributed to this event. The licensee's corrective actions included issuing night orders to operating crews which reinforced the need for attention to detail when completing entries in the operability tracking log in accordance with Procedure OPOP01-ZQ-0030, "Maintenance of Plant Operations Logbooks," Revision 6, and Procedure OPGP03-ZA-0063, "Safety Function Checklist (Modes 1-4)," Revision 8. A discussion of this event and its consequences were included in the lessons learned training (Course LOR892, subject No. 8) for control room operators. This item is closed.

(Closed) LER 89-11: "Inadvertent Safety Injection and Reactor Trip System Actuation Due to Personnel Error" - Unit 2

On April 10, 1989, Unit 2 was in Mode 3 during heatup prior to going critical. A safety injection and reactor trip system actuation occurred on low steam line pressure (less than 735 psig). No borated water was injected into the RCS. The RCS pressure was greater than 2220 psig which is a higher pressure than the shutoff head of the safety injection (SI) pumps. The licensee determined the cause of the event was personnel error. Two steps in plant heat up Procedure 1P0P03-ZG-0001, "Plant Heat-Up," Revision 11, were inadvertently skipped and RCS pressure was increased without a corresponding increase in steam line pressure. The operator was counselled regarding this event and the need for attention to detail in procedure utilization. Night orders were issued to the operating crews regarding this event. A caution statement ("IF RCS pressure is allowed to increase to greater than 1985 psig AND Steam Generator pressure is less than 735 psig, THEN a Safety Injection Actuation will occur") was added to paragraph 8.16.7 of the plant heat up procedure. This procedure addition identified the potential for SI actuation on low steam line pressure when the RCS pressure is increased. A discussion of this event and its consequences were included in the lessons learned training (Course LOR892, subject No. 10) for control room operators. This item is closed.

(Closed) LER 89-13: "Reactor Trip Due to Spurious Actuation of a Reactor Trip Breaker" - Unit 2

On April 15, 1989, Unit 2 was in Mode 1. A reactor trip occurred when the Train S reactor trip breaker (Type DS-416) opened. The licensee's investigation determined that the reactor trip could have occurred because of a spurious trip of the reactor trip breaker, either due to a breaker

fault or a spurious trip signal which cleared before the spurious trip could be recorded. The reactor trip breaker was inspected and tested to verify operation to specifications. The licensee did not identify any problems with the reactor trip breaker or associated circuitry. The reactor trip breaker was replaced with a spare breaker. The undervoltage trip driver card was exchanged to the other trip circuit so that additional trips, if any, could be identified with the proper component. This item is closed.

(Closed) LER 89-14: "Partial Loss of Offsite Power Due to a Spurious Generator Protective Relay Actuation" - Unit 2

On April 18, 1989, Unit 2 was in Mode 5 for a maintenance outage. A loss of offsite power occurred to the main and auxiliary transformers due to a trip of the 345 KV switchyard breakers that feed the main transformers. This resulted in a loss of power to the Train A 4.16 KV ESF bus E2A. DG No. 21 started and loaded as required. The BOP (nonsafety-related) DG failed to start. WR DB-76168 was initiated to investigate the cause of the BOP DG failure to start. The licensee found that the BOP DG fuel rack actuation linkage was out of adjustment. The fuel rack actuation linkage was adjusted to provide sufficient fuel for the BOP DG to start. The BOP DG started and ran successfully in both manual and automatic start modes after adjustments had been completed.

The licensee performed inspection and testing on the main generator protective relaying. WR PB-81245 was initiated to investigate the reason for relay actuation. The licensee identified no problem areas with the main generator protective relays or potential transformer (PT) circuits which could have caused the trip. No condition was identified within the permanently installed equipment which could cause this event. The licensee determined that the most probable cause of this event was the backfeed of voltage to the main generator protective relays due to a component failure within an external phase angle meter that had been placed in the circuit for test purposes only. The main generator protective relaying was inspected and tested prior to returning the main generator to service. The external phase angle meter was removed from the circuitry. This LER is not related to Unit 2 LER 89-09 discussed above. This item is closed.

6.0 Exit Interview

The inspector met with licensee representatives (denoted in paragraph 1) on July 14, 1989. The inspector 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.