

DETAILS

1. Persons Contacted

Licensee Employees

- *R. B. Starkey, Plant General Manager
- *W. Crawford, Manager, Operations and Maintenance
- *J. Curley, Manager, Technical Support
- *F. Lowery, Operations Supervisor Unit 2
- R. Chambers, Maintenance Supervisor Unit 2
- *F. Gilman, Senior Specialist, Regulatory Compliance
- *C. Wright, Specialist, Regulatory Compliance
- G. Chappell, Project Engineer (ISI)
- S. Clark, Engineer
- D. Waters, Principal Engineer-Operations
- *M. Page, Engineering Supervisor

Other licensee employees contacted included technicians, operators, mechanics, security force members, and office personnel.

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on December 11, 1981 with those persons indicated in paragraph 1 above.

3. Licensee Action on Previous Inspection Findings

(Closed) Severity Level IV Violation 81-27-33. This item concerned the licensee's failures to conduct post-maintenance testing on 'B' containment spray flowpath. The inspector reviewed the licensee's response letter of November 18, 1981 and LER 81-20. The licensee has completed his corrective actions, which appear adequate.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraph 13a.

5. Plant Operations Review

- a. The inspector periodically during the inspection interval reviewed shift logs and operations records, including data sheets, instrument traces, and records of equipment malfunctions. This review included control room logs, auxiliary logs, operating orders, standing orders, jumper logs and equipment tagout records. The inspector routinely

observed operator alertness and demeanor during plant tours. During abnormal events, operator performance and response actions were observed and evaluated. The inspector conducted random off-hours inspections during the reporting interval to assure that operations and security remained at an acceptable level. Shift turnovers were observed to verify that they were conducted in accordance with approved licensee procedures.

- b. On November 18, 1981, with the plant in hot shutdown, a reactor trip occurred due to a high steam flow signal on 'A' steam generator (S/G) coincident with a low water level signal. Instrumentation and control technicians were performing surveillance on the 'A' S/G water level circuitry. Steam flow channel, FT 474, had previously been identified as out of tolerance high for the no steam flow condition (main steam isolation valves and bypass valves shut) and drifted higher to the setpoint for steam-feed flow mismatch. The shutdown bank rods inserted as required.
- c. Following the trip above, maintenance was necessary to repair FT 474 and 'C' steam flow channel FT 495, which were out of tolerance high. Operations personnel used the applicable operations Work Procedures to remove the channels from service. The plant was in hot shutdown and a low T average condition existed, so a safety injection initiation occurred when the second steam flow channel was tripped. All safety systems operated as required.

This event was caused by the operator's failure to recognize that plant conditions would not allow tripping flow channels on different steam lines. The inspector will continue to monitor licensee corrective actions. Corrective actions to date include management meetings with senior operations personnel to emphasize this event and other recent operator errors.

- d. On December 3, 1981, at 23% power, a reactor trip occurred on high level in 'B' steam generator. The operators were shifting feed control from the bypass valve to the feed regulating valve (FRV). When the block valve for 'B' FRV was opened, 'B' FRV was hung open at 40%. This resulted in overfeeding of 'B' S/G. The licensee declared an unusual event and informed the NRC. The deficiency on 'B' FRV was corrected, and the plant returned to power operation the same day.
- e. On December 7, 1981, at 75% power, the reactor tripped on low-low S/G level, on 'B' S/G. This resulted from 'B' main steam isolation valve (MSIV) failing shut. A grounded limit switch caused the valve control power fuse to blow, resulting in the valve failing safe. All limit switches on all three MSIV's were checked and repaired as necessary, the control circuit was returned to service, and the plant returned to power operation the same day.

6. Technical Specification Compliance

- a. During this reporting interval, the inspector verified compliance with selected limiting conditions for operation (LCO's) and reviewed results of selected surveillance tests. These verifications were accomplished by direct observation of monitoring instrumentation, valve positions, switch positions, and review of completed logs and records. The licensee's compliance with selected LCO action statements were reviewed as they happened.
- b. On november 20, 1981, with the plant at 55% power unidentified reactor coolant system leakage of about 1 gallon per minute (gpm) was determined. Investigation concurrent with the alarm of the steam generator (S/G) blowdown monitor determined that 'A' steam generator had a primary-to-secondary leak rate of about 1.5 gpm. This exceeded the limiting condition for operation of Technical Specification 3.1.5.3. A plant shutdown to cold shutdown mode was commenced, and the plant reached cold shutdown the following day. 'C' S/G was determined to have about a 0.2 gpm leak also. Further investigation determined that 'A' S/G had a leaking tube plug and 'C' S/G had one tube with a pluggable indication in the tubesheet region. The licensee conducted eddy current probing of the seven tubes surrounding the leaking tube in 'C' S/G. No pluggable indications were found, so the leaking tube was plugged. A weld repair was made on the leaking plug in 'A' S/G. No violations or deviations were note.

7. Plant Tour

The inspector conducted plant tours periodically during the inspection interval to verify that monitoring equipment was recording as required, equipment was properly tagged, operations personnel were aware of plant conditions, and plant housekeeping efforts were adequate. The inspector determined that appropriate radiation controls were properly established, excess equipment or material was stored properly, and combustible material was disposed of expeditiously. During tours the inspector looked for the existence of unusual fluid leaks, piping vibrations, pipe hanger and seismic restraint abnormal settings, various valve and breaker positions, equipment clearance tags and component status, adequacy of firefighting equipment, and instrument calibration dates. Some tours were conducted on backshifts. The inspector performed major flowpath valve lineup verifications and system status checks on the following systems:

- a. Selected containment isolation valves
- b. Steam and Motor Driven Auxiliary Feedwater Systems
- c. Component Cooling Water System
- d. Residual Heat Removal System

No violations or deviations were identified.

8. Physical Protection

The inspector verified by observation and interview during the reporting interval that measures taken to assure the physical protection of the facility met current requirements. Areas inspected included the organization of the security force, the establishment and maintenance of gates, doors and isolation zones in the proper condition, that access control and badging was proper, that search practices were appropriate, and that escorting and communications procedures were followed.

9. Target Axial Flux Difference Calculation

The inspector reviewed the licensee's procedures for determining the target axial flux difference and the results of the measurements made since July, 1981. The inspector noted that the new target delta flux values entered in the plant computer on September 4 and 18, 1981 were not determined in accordance with the required initial conditions of Periodic Test 1.8. The procedure states that if target values are to be determined, Control Bank D rods must be above 190 steps. Control Bank D rods were at 166 and 174 steps during the respective tests. The inspector discussed this failure to follow the procedure with licensee management, and corrective action was taken with the individuals concerned. In that reactor power was limited to 50% during the period the incorrect target values were in the computer, this event had negligible safety significance. No other deficiencies were noted in test performance and correct target values were entered in the computer on October 7, 1981.

10. ESF Reset Modification

This item concerns modifications made to the Engineered Safety Features (ESF) circuitry to correct the design deficiencies discussed in IE Inspection Report 50-261/81-26. The inspector reviewed Modification package M-626. This modification as implemented prevents the overriding of the ESF initiation in the circuitry for Containment Ventilation Isolation, Phase A and B Containment Isolation, Containment Spray Actuation and Feedwater Isolation. Basically, these circuits now can't be reset with the actuating signal still present. Additionally, the manual initiation pushbutton is not affected by an open or failed reset switch. In the case of the Safety Injection (SI) actuation circuitry, the modification provides annunciation if an SI is reset with the actuating signal still present. Should a different SI signal be received, annunciation will warn the operator and he will take manual action at the component level. The manual SI initiation pushbutton has also been modified so that it cannot be blocked by an open or failed reset switch.

The inspector verified that the appropriate reviews and approvals were conducted, that operating procedures were changed, that modification activities were conducted in accordance with procedures, and that acceptance testing was satisfactorily conducted. The inspector noted that the test procedure, as written, was not always consistent with plant design. This resulted in the operations personnel having to make several procedural

changes during the test to complete the test adequately. It appeared that better pre-test coordination between operations and engineering personnel was needed.

Based on the above review, the ESF modifications appear to adequately address the NRR concerns and conform to the Licensee's commitments in their letter of August 29, 1981. Inspector followup item 81-26-02 is closed.

11. Reduced Primary Coolant Temperature Operation

On November 13, 1981, Amendment 61 to the Operating License was issued to allow plant operation at reduced primary coolant temperature. The purpose of this change was to reduce steam generator tube degradation by lowering hot leg temperature, while optimizing electrical output. Modification M-627 was developed to implement changes to the protection and control instrumentation setpoints. The inspectors reviewed the modification and control instrumentation setpoints. The inspectors reviewed associated procedures and tests to assure compliance with the license amendment and regulatory requirements. The inspectors reviewed the adequacy of the safety evaluation, verified that setpoint and gain changes were made using reviewed and approved procedures and that instrumentation was tested post-modification, verified that revised procedures relating to the modified system were approved and implemented prior to startup, observed that the approach to criticality was within allowable margins and observed portions of the approved special test for power escalation. No violations or deviations were identified.

12. Followup on IE Bulletins

For the following Bulletins, the inspector verified that the response was timely, included the required information, contained adequate commitments and that corrective action as described in the written responses was completed.

IE Bulletin 80-18, Maintenance of Adequate Minimum Flow Through Centrifugal Pumps. The inspector reviewed CP&L responses dated September 22 and December 4, 1980, Plant Nuclear Safety Committee minutes No. 766, and a letter dated January 21, 1981 from Worthington Pump. The licensee conducted the required testing on the Safety Injection pumps. The test results revealed a flow rate of as low as 35 gpm on one pump's recirculating line. Worthington was contacted and documented its position that it is satisfactory to recirculate 35 gpm of less than 100°F water for thirty minutes a month during surveillance. A review of ISI pump operability data has shown no pump degradation from running the pump on recirculation flow for surveillance. This Bulletin is closed.

13. Plant Transient

On November 30, 1981, with the plant in hot shutdown, operators discovered a leak on the body-to-bonnet flange on the 'A' charging pump to seal injection manual isolation valve. Leakage rate was about 50 gpm. The operators

secured all reactor coolant pumps and secured charging pumps and letdown flow to allow leak isolation. With the leak isolated, seal injection capability was lost. Due to the 1000-1500 gallons of charging water released to the auxiliary building, the licensee declared an unusual event. With charging and letdown secured, primary pressure increased to 2280 psig. The operators secured pressurizer heaters, but did not feel pressure was decreasing, and opened the block valves to both power operated relief valves (PORV's). Due to leakage past the PORV's, primary pressure decreased with the PORV's shut, so the operators attempted to shut the block valves. The block valves did not shut fully from the control board, so an operator was dispatched to the valves' controllers to attempt to seat the valves. This action reduced leakage, but did not stop it completely. The operators also opened a steam generator PORV to aid in the establishment of natural circulation cooldown and primary pressure decreased to 1715 psig which initiated safety injection. Charging flow from B and C charging pumps was restored and primary pressure remained above 1450 psig, precluding any significant safety injection. When pressurizer level was recovered from a low of about 10%, all heaters were energized and primary pressure returned to about 2000 psig. Decay heat removal was never a problem due to the plant having been shut down for nearly a month. Safety injection and phase A isolation were reset when plant conditions had stabilized. Additionally, the licensee received a bomb threat during the event, which resulted in an evacuation of unnecessary personnel and a search of the plant. No bomb was found and the unusual event was terminated. Throughout the event the reactor coolant system was borated to the cold shutdown concentration. There was no offsite release, and no significant personnel exposure or contamination.

The inspector identified several concerns from this event:

- a. The PORV's have leaked for several years because the valve operators were modified and their spring tension adjusted to reduce the valves' stroke times. This was deemed necessary to allow the valves to be utilized as the Technical Specification required relief valves for low temperature overpressure protection (LTOPP). The reduced spring tension resulted in valve leakage in hot shutdown and at power. For this reason, the block valves for the PORVs have been shut, except when required for LTOPP. The operators were aware the PORVs leaked, but apparently underestimated its magnitude. Due to the partial depressurization which occurred when the block valves failed to shut, the NRC is concerned that this condition was a significant safety hazard.

The licensee's investigation of the block valve failure determined that the apparent cause is undersized motor operators on the block valves. The licensee is investigating how the plant was built with this deficiency and reported this finding to the NRC as potentially generic on December 2, 1981. Based on the block valve inadequacy, the licensee returned PORV spring tension to its original design value and conducted satisfactory leakage tests to verify the PORV leakage was within Technical Specification limits. Except for LTOPP operations, the block valves are shut and power removed from their operators. Standing

Order-17 was established to govern use of the block valves and PORV's during normal and emergency operation. These procedures appear adequate until long term resolution of the block valves/PORV problems is achieved. The licensee anticipates resolving these problems during the 1982 refueling outage. This is an open item. (50-261/81-32-01).

Discussions with licensee personnel and review of plant modification files revealed the following information. As a result of NRC concerns over overpressurization events during periods where the plant was in a solid condition, CP&L installed the LTOPP system to protect the plant from exceeding the Appendix G NDT curves using guidelines provided by Westinghouse and Southwest Research, Inc. Modification M-418 was implemented in 1978 to provide a second PORV setpoint of 400 psig and a valve opening time of two seconds for LTOPP conditions. At that time the valve spring compression was retained at normal settings and the PORV was able to open within the required two seconds. In April 1979 the plant experienced a transient operation of the LTOPP during plant cooldown. During the review of the system response to this event, the licensee determined that the valve internals needed modification to achieve the design response. Modification M-480 provided improved design plug, cage, and stem assemblies for each PORV and was installed and tested about May 1979. Although the inspector has not found the applicable documentation, it appears that the PORV spring compression had to be adjusted (lowered) to achieve the two second opening time. This spring tension adjustment apparently resulted in the PORV lifting off its seat at normal operating pressure. As a result, the PORV block valves were closed to prevent PORV leakage above 350°F plant temperature.

As a result of the November 30 transient, the spring compression on the PORV's was raised to obtain the original design closing force for power operation. This restored the PORV's operability at high pressures and satisfied the Technical Specification requirements on leakage. During the testing that followed resetting spring compression, it appeared that the valves would now open within two seconds with no pressure under the plug. This would suggest that the previous valve opening time problems may have been due to tight packing. In order to determine the PORV opening response, a special test is planned for December 12, 1981.

Based on the above, the inspector is concerned that

- (1) Inadequate controls on maintenance or modifications to the PORVs contributed to their leakage and removal from service
- (2) PORV leakage (with block valves open) may have exceeded Technical Specification limits on reactor coolant system pressure boundary leakage.

- (3) Closing of the PORV block valves and continued operation with leaking PORV's did not receive the appropriate Plant Nuclear Safety Committee review and approval.

These issues require more information from the licensee to resolve. This is an unresolved item. (50-261/81-32-02).

- b. Due to the block valve failure, the inspector reviewed the licensee's surveillance program on the PORV's and block valves. These valves are included in the licensee's Inservice Inspection (ISI) letter of March 10, 1981 to ONRR. This letter states that the block valves (RC 535 and 536) are normally open valves that are tested quarterly for full stroke and stroke time. The PORV's are normally closed and are tested quarterly for full stroke, stroke time, and observation of failure mode. The test procedure to implement the testing of these valves is PT 42.0, ISI Primary Valve Test, Cold Shutdown Interval. This test does not test the valves quarterly, but at cold shutdown. The licensee stated that the quarterly test requirement was an error in their submittal which has been discussed with NRR, and will be corrected in a pending submittal revision. This is previous inspector followup item 81-19-02.
- c. On receipt of the SI signal, B diesel generator started, but only came up to 220 volts vice 480 volts. An operator was dispatched and diesel generator voltage was raised manually to 440V. The failure of the diesel to automatically respond as required is a reportable occurrence. Subsequently, the automatic voltage control (AVC) rheostat was found to have an open coil, and was replaced the same day. 'B' diesel generator was tested satisfactorily and returned to service. 'A' diesel generator performed correctly throughout the event. The inspectors determined that the 'B' diesel generator AVC rheostat had exhibited control problems during surveillance on November 9. The rheostat had been cleaned and the wiper tension adjusted. The inspector asked the licensee if the previous problems may have warned of impending failure. The licensee disagreed, stating that the rheostat had performed acceptably on three previous weekly surveillance tests. The licensee agreed to investigate the acceptability of the practice of cleaning rheostats.
- d. The inspector was concerned that FT-943, Safety Injection flow transmitter for indicating flow to the cold legs, was out of service for the event and had been for about one year. This instrumentation is not required by plant Technical Specifications. The licensee stated that other indication was available for determining flow and that a modification to replace the inoperable flow transmitter was waiting parts. The inspector emphasized the importance of such instrumentation, and the licensee installed a temporary flow transmitter until the permanent modification can be completed.

The licensee is still evaluating the full ramifications of the plant transient and will produce a plant operating event report for use as a

lessons learned tracing document. The inspector will review this document when available in January 1982.

14. Licensee Event Report (LER) Followup

The inspector reviewed the following LER's to verify that the report details met license requirements, identified the cause of the event, described appropriate corrective actions, adequately assessed the event, and addressed any generic implications. Corrective action and appropriate licensee review of the below events was verified. The inspector had no further comments.

LER	Event
81-20	Failure to test containment spray header operability following maintenance
81-22	Heat trace circuit failure
81-26	Leak in 'A' steam generator

15. Review of IE Notices IEN's

The inspector verified that IE Notices had been received onsite and reviewed by cognizant licensee personnel. Selected applicable IE Notices were discussed with licensee personnel to ascertain the licensee's actions on these items. The inspector also verified that IE Notices were reviewed by the Plant Nuclear Safety Committee in accordance with facility administrative policy. Licensee action on the following IE Notices were reviewed by the inspector and are closed.

IE Notices

80-09
81-08

16. Outstanding Item Review

(Closed) Open item 81-25-06. This item concerns the lack of a formal mechanism for keeping track of temporary procedure changes. The licensee has revised Administrative Instructions section 5.5.1(f) to require that the working copy of the procedure be changed and the change identified by appropriate marking. This appears adequate.

(Closed) Open item 81-19-04. This item concerned the lack of a formal administrative limit on filling Waste Condensate Tanks C, D, and E. The licensee has incorporated this limit in his Operating Notes and is in the process of including the guidance in the applicable Operating Procedure. This item is closed.

(Closed) Inspector Followup Item 81-06-15. This item concerned dispatching at least two environmental survey teams in response to a plant emergency

with a potential radioactive release. The licensee has established two pre-positioned sets of monitoring equipment to support two monitoring teams. As previously noted in IE Inspection Report 50-261/81-27, the licensee has not fully amended Volume 13 of the Plant Operating Manual to reflect this change. This item is closed.

(Closed) Inspector Followup Items 81-06-16 and 81-06-17. These items concerned upgrading field monitoring team instrumentation and methodology. The licensee has revised his Volume 13 Emergency Procedures to provide for prompt dispatch of the offsite environmental monitoring teams and to track and monitor a radioactive plume with ionization chamber equipment. These procedures now allow detection and measurement of radioactive iodine as low as 10⁻⁷ micro Ci/cc with the monitor team equipment. Training for affected personnel has been conducted. Both items are closed.

(Closed) Inspector following item 81-26-02. As discussed in paragraph 10, this item is closed.

(Closed) Open item 81-27-04. This item dealt with a concern that the Shift Foreman should review completed clearances prior to issuing. A review of the clearance procedures, Operations Work Procedures guidance, minimum equipment list guidance, and equipment inoperable records was conducted. Based on this review, the inspector finds that present administrative controls on safety-related equipment appear to meet regulatory requirements. Present required Shift Foreman reviews appear adequate. This item is closed.