

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Inspection Report: 50-313/94-12  
50-368/94-12

Licenses: DPR-51  
NPF-6

Licensee: Entergy Operations, Inc.  
Route 3, Box 137G  
Russellville, Arkansas

Facility Name: Arkansas Nuclear One, Units 1 and 2

Inspection At: Russellville, Arkansas

Inspection Conducted: February 2-8, 1994

Inspectors: S. Campbell, Resident Inspector  
L. Smith, Senior Resident Inspector

Approved:   
Thomas F. Stetka, Chief, Project Branch D

3/1/94  
Date

Inspection Summary

Areas Inspected (Unit 1): A special inspection was conducted to determine the events surrounding five of six crews totaling 15 licensed operators failing to identify an inoperable steam generator low level transmitter.

Areas Inspected (Unit 2): No inspection of Unit 2 was conducted.

Results (Unit 1):

- Two apparent violations were identified:

- (1) The first apparent violation involved the failure to perform a plant shutdown as required by Technical Specification 3.4.5.1. One emergency feedwater (EFW) flow path was inoperable because of a drifting steam generator level transmitter indication (Section 2.1).

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- (2) The second apparent violation involved the failure to follow procedures regarding licensed operator responsibilities for safety-related log recording and plant operations relative to the inoperable steam generator level transmitter (Section 2.2).
- Supervisor and licensed operator complacency contributed to the operator mind set that the problem had already been adequately dispositioned and, therefore, obscured recognition of an inoperable level transmitter (Section 2.2.3).
  - The inoperable level transmitter provided an input for automatic control of EFW Flow Control Valve CV-2645. As a result, the flow from the turbine driven EFW pump to Once Through Steam Generator (OTSG) E-24A would have been less than required. However, the motor-driven feedwater pump would have provided adequate flow to OTSG E-24A (Section 3).
  - Neither starting of the pump nor the ability for the operators to take manual control to restore the degraded EFW flow path was impacted as a result of the inoperable level transmitter (Section 3).

Summary of Inspection Findings:

- Apparent Violation 313/9312-01 was opened (Section 2.1).
- Apparent Violation 313/9312-02 was opened (Section 2.2).

Attachments:

- Attachment - Persons Contacted and Exit Meeting

## DETAILS

### 1 OVERVIEW

OTSG Low Level Transmitter LT-2622 provided an input to the control circuit for Control Valve CV-2645 which was in the discharge path from the turbine-driven EFW pump to OTSG E-24A. Similarly, Low Level Transmitter LT-2618 provided an input to the control circuit for Control Valve CV-2646, which was in the discharge path from the motor-driven EFW pump to OTSG E-24A. Either EFW pump had sufficient capacity to provide required flow to both steam generators.

Low Level Transmitter LT-2668 provided input to a recorder in the control room. Low Level Transmitters LT-2622 and LT-2618 provided input to indication in the control room. The three level indications were compared once per shift to ensure they were consistent. Based on analysis, the loop error was calculated to be 8 inches. Therefore, the licensee determined that the operability difference in indicated level should be 8 inches. If the variation in indicated level exceeded 8 inches, the licensee was required by procedure to declare the transmitter inoperable. The licensee determined that the maximum difference during operations was 5 inches. If the indicated level disagreed more than 5 inches, action was required by procedure to evaluate and correct the deviation.

On January 22, 1994, Steam Generator Low Level Transmitter LT-2622 indication drifted in excess of the allowed maximum difference between the redundant level transmitters (5 inches). The control board reactor operator (CBRO) circled the high level indication, which was recorded in the CBRO log sheet, noted the deficiency on the last page of the log sheet, and initiated a job request.

On January 28, Steam Generator Low Level Transmitter LT-2622 indication drifted in excess of the allowed operability difference between the redundant level transmitters (8 inches). The identification of the inoperable level transmitter went unnoticed until January 31 when the CBRO identified that the LT-2622 indication varied from the associated level transmitter indications by more than the allowed operability difference.

On January 31 at 9:50 p.m., the CBRO initiated a condition report. After evaluation, the licensee entered Technical Specification 3.4.5.1, which had a 36-hour allowed outage time for an inoperable EFW flow path. The Technical Specification action statement was satisfied when the plant was placed in a hot shutdown condition at 1:55 p.m. on February 1.

## 2 DETAILED INSPECTION FINDINGS

### 2.1 Failure to Satisfy Technical Specification Action Statement

During the period of January 28 midshift and 9:50 p.m. on January 31, the operability difference of 8 inches between redundant steam generator level transmitter indication channels was exceeded for approximately 58 hours. The excessive operability difference for steam generator low level indication was caused by the Steam Generator Low Level Transmitter LT-2622 indication drifting high. This level transmitter provided automatic positioning of EFW Control Valve CV-2645. As a result, during operation insufficient flow would have been supplied from the turbine-driven EFW pump to OTSG E-24A. This caused one EFW flow path to be inoperable.

Technical Specification 3.4.5.1 requires that, if one EFW flow path is inoperable, the unit must be brought to the hot shutdown mode within 36 hours. The failure to be in hot shutdown prior to the expiration of the 36-hour allowed outage time was an apparent violation of Technical Specification 3.4.5.1 (313/9412-01).

### 2.2 Inadequate Performance of Licensed Activities

The inspectors conducted interviews with control room personnel and reviewed procedures to determine the operator's responsibility for log taking and log reviews. Based on the interviews with the control room personnel, the CBRO performed and completed the CBRO logs generally at the beginning of the shift. The control room supervisor (CRS) or the shift superintendent (SS) was responsible for performing a review of all operator logs generally at the end of the shift to ensure Technical Specification compliance. The SS assigned to the midshift was also responsible for an oversight review of all logs on a spot check basis to ensure Technical Specification compliance and to identify deviations and log taking errors. The SS or the CRS flagged log errors and rerouted the logs back to the operators for corrections as necessary.

#### 2.2.1 Inadequate Log Taking Activities

On January 22, the day shift CBRO recorded that steam generator level channel indication varied greater than the maximum difference of 5 inches prescribed in the operating log. Steam Generator Low Level Transmitter LT-2622 indicated 58 inches while the two corresponding level transmitters indicated 52 inches. The operator appropriately circled and footnoted the value, initiated Job Request 897752 to repair Level Transmitter LT-2622, and referenced the job request on the last page of the log. The operators continued circling and footnoting the variance until January 31 when the midshift CBRO noticed that the level indication variance was greater than the operability difference. He noted, on January 31, that Level Transmitter LT-2622 indication had previously drifted in excess of the allowed operability difference between the redundant level transmitters during midshift on January 28. On January 28, Low Level Transmitter LT-2622 indicated 60 inches as compared to the output from Low

Level Transmitter LT-2618 which indicated 51 inches. The output to the recorder from Low Level Transmitter LT-2668 was 52 inches.

Technical Specification 6.8.1.a requires, in part, written procedures be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33.

Procedure 1015.003A, Revision 31, "Unit One Operations Logs," provided instructions for comparing related indications, calculating the variation between channels, determining when a maximum difference had been exceeded, and determining when an instrument channel became inoperable, that is, when the operability difference had been exceeded. Step 6.5.4 of Procedure 1015.003A required that a condition report be initiated, the affected channel or indicator be declared inoperable, and any actions required by Technical Specification limiting condition for operation be implemented when the operability difference was exceeded.

The licensed operators did not determine that the level transmitter was inoperable until January 31, 1994, and therefore, did not immediately initiate a condition report or implement the Technical Specification action statement for an inoperable EFW flow path.

Procedure 1015.003A, Form 1015.003A-7, "CBO Reactor Log Sheet," Footnote 2, required that, if the operability difference limits are exceeded, the SS/CRS be notified immediately, a condition report be initiated, and the affected instruments be declared inoperable.

The CBRO did not immediately notify the SS/CRS of the exceeded operability limit, which occurred on January 28 midshift and, as a consequence, failed to initiate a condition report and declare the level channel inoperable until January 31.

The responsibility for accurately recording the level indication in the log sheet, comparing previous values, and informing the SS/CRS of any abnormal trends was delegated to the CBRO. Step 6.5.2 of Procedure 1015.001, Revision 46, "Conduct of Operation," required the CBRO to monitor plant operating parameters and to notify the SS/CRS of abnormal trends or equipment malfunctions.

On January 28, the CBRO failed to appropriately monitor the level transmitter indication and, as a result, did not notify the SS/CRS that the level indication exceeded the operability difference value.

The failure on January 28 to comply with Procedures 1015.003A and 1015.001, when the variation in indicated level for OTSG E-24A exceeded the operability difference, was an apparent violation of Technical Specification 6.8.1.a (313/9412-02)

### 2.2.2 Inadequate Log Review Activities

Step 8.7.1 of Procedure 1015.001, Revision 46, "Conduct of Operation," required review of the daily log sheets by the SS/CRS to assure completeness and to identify any significant changes. It also required that, if significant changes are identified that support reasons for these changes, these reasons be documented. The CRSs routinely performed a review of the CBRO logs during each shift to ensure compliance with the Technical Specifications; however, they did not identify that Steam Generator Low Level Transmitter LT-2622 indication drifted high as compared to the other two corresponding steam generator level transmitter indications and exceeded operability difference.

Step 6.1.2 of Procedure 1015.001 required that the SS identify malfunctioning components and initiate corrective action. Step 8.4.5 of this procedure also required the operations manager or his designee to ensure all daily log sheets were reviewed for completeness, accuracy, consistency, and trends. The midshift SS routinely performed oversight reviews of operating logs; however, the SS did not identify that the Steam Generator Low Level Transmitter LT-2622 indication drifted high on January 28.

Inattention to detail by the CRSs and midshift SS, representing the operations department management, resulted in an inadequate review of the CBRO logs. They failed to recognize that the level indicator variation exceeded the operability difference and, as a result, failed to perform a Technical Specification required plant shutdown.

### 2.2.3 Contributing Causes

Based on interviews with the licensed operators, the inspectors concluded that the operators became complacent after the level indicator was identified as varying from the corresponding level indicators by an amount greater than the maximum difference. The operators became accustomed to the exceeded value being circled and footnoted repeatedly in the CBRO logs through several shifts. They developed a mind set that sufficient measures had been initiated to address the defective level channel. Therefore, they did not perform the necessary mental calculation to determine if the operability difference was exceeded. Further, the CBROs lacked a questioning attitude for an abnormally increasing trend between channels and, as a result, did not identify the inoperable safety-related level transmitter.

The CBRO performed and completed the CBRO logs generally at the beginning of the shift. The SS/CRS was responsible for performing a final review of all operator logs generally at the end of the shift. All the operators stated they had received a thorough turnover from the previous shift. The shift administrative burdens and workloads were not considered to be excessive by most of the operating crews.

### 3 SAFETY SIGNIFICANCE OF THE DEGRADED EFW FLOW PATH

The level transmitter output provided automatic modulation of Control Valve CV-2645 for OTSG E-24A level control to remove reactor decay heat following EFW initiation control system actuation. The ability to start any of the EFW pumps was never compromised as a result of the inoperable level transmitter; however, the ability to automatically control the EFW flow from turbine-driven EFW Pump P-7A to OTSG E-24A following EFW initiation control actuation was degraded. The output from Low Level Transmitter LT-2622 drifted high and, as a result during low level operation, Control Valve CV-2645 would have closed, limiting flow to OTSG E-24A from EFW Pump P-7A. The ability to identify and take manual control of the valve to provide EFW from Pump P-7A via operator intervention was not affected.

Based on the inspectors' review of the control room station logs, the alternate path for providing EFW from the motor-driven EFW Pump P-7B to OTSG E-24A remained available and operable from January 28-31.

### 4 LICENSEE CORRECTIVE ACTIONS

A dedicated operator was stationed in the Unit 1 control room to manually control the level in OTSG E-24A should the need arise. The control room logs were reviewed to determine if other oversights had occurred. The licensee stated that no significant deficiencies were noted. Licensed personnel met with their supervision to discuss this event and the importance of log reviews associated with Technical Specification requirements.

## ATTACHMENT

### 1 PERSONS CONTACTED

#### Licensee Personnel

S. Bennett, Acting Licensing Supervisor  
H. Carpenter, Unit 1 Maintenance Instrumentation and Control  
M. Cooper, Licensing Specialist  
R. Fuller, Unit 1 Acting Operations Manager  
R. King, Acting Licensing Director  
M. McFarland, Inhouse Event Analysis  
T. Mitchell, Unit 2 System Engineer  
T. Reichert, Unit 1 Acting System Engineer Manager  
M. Ruder, Inhouse Event Analysis Technical Specialist  
R. Scheide, Licensing Specialist  
J. Selva, Unit 1 Technical Assistant Plant Manager  
J. Vandergrift, Unit 1 Plant Manager  
D. Wagner, Quality Assurance Supervisor  
T. Wilkins, Unit 1 Maintenance Instrumentation and Control  
C. Zimmerman, Unit 1 Operations Manager

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

### 2 EXIT MEETING

An exit meeting was conducted on February 9, 1994. During this meeting, the inspectors reviewed the scope and findings of the report. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors. The licensee acknowledged the inspection findings. The Unit 1 plant manager made the following statement regarding the inspection findings:

"We are disappointed that operations did not identify the out-of-tolerance condition as required. We are trying to correct the inattention to detail condition and we will followup on how to deal with the error in a comprehensive manner. Even though we do not consider this specific event to be safety significant, we want to prevent similar conditions from occurring in the future."