

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

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50-368

License Nos.: DPR-51
NPF-6

Report No.: 50-313/96-08
50-368/96-08

Licensee: Entergy Operations, Inc.

Facility: Arkansas Nuclear One, Units 1 and 2

Location: Junctions of Hwy. 64W and Hwy. 333 South
Russellville, Arkansas

Dates: November 10 through December 21, 1996

Inspectors: K. Kennedy, Senior Resident Inspector

I. Melfi, Resident Inspector

S. Burton, Resident Inspector

G. Good, Emergency Preparedness Analyst
Division of Reactor Safety

Approved By: Elmo E. Collins, Chief, Project Branch C
Division of Reactor Projects

ATTACHMENT: Supplemental Information

EXECUTIVE SUMMARY

Arkansas Nuclear One, Units 1 and 2 NRC Inspection Report 50-313/96-08; 50-368/96-08

This routine announced inspection included aspects of licensee operations, maintenance, and plant support. The report covers a 6-week period of resident inspection; in addition, it includes the results of an announced inspection by a regional emergency preparedness inspector.

Operations

- The licensee responded appropriately to the indications of increasing primary-to-secondary leakage in the Unit 2 Steam Generator B. The licensee decided to shut down the plant when the leak rate increased to 40 - 60 gpd, which was well below the limit contained in Technical Specifications and the abnormal operating procedure and indicated a conservative operating philosophy (Section 01.2).
- Unit 1 operators demonstrated a good questioning attitude in response to a slight increase in reactor coolant system leak rate and identified an increase in primary-to-secondary leakage. The licensee established an aggressive sampling schedule to monitor the leakage and took other actions to improve their assessment of the leakage. Although the leak rate decreased from approximately 80 gpd to 30 gpd, the licensee continued to closely monitor the leakage (Section 01.4).
- Unit 2 containment closure was thorough and complete with the proper focus on structural and systems integrity. Deficiencies identified during the walkdown were properly dispositioned (Section 01.5).
- During the startup of Unit 2, operator performance was properly focused on safety with adherence to procedures, Technical Specifications, and other requirements. Personnel demonstrated a strong attention to detail and concern for safe operations as evidenced by peer checks and additional briefings. Deficiencies were properly identified and addressed by supervisory and support personnel (Section 01.6).

Maintenance

- The licensee's decision to replace trip latch roller bearings on the Unit 2 General Electric Magne-Blast breakers sooner than originally planned was prudent given the failure of the reactor coolant pump breaker to open due to grease hardening. The bearing replacement observed by the inspectors was performed well by knowledgeable technicians (Section M1.1).
- The inspectors concluded that the licensee's workers and technicians were knowledgeable, followed their procedures, and showed good worker practices (Sections M1.2 and M1.3).

- Inspectors identified that the procedural controls for securing equipment in the plant were weak. Numerous example of questionable practices were identified (Section M2.1).

Engineering

- The inspectors concluded that the modifications made to the Unit 2 reactor coolant pump motor oil collection system were sufficient to address previously identified deficiencies in these areas. Although the licensee had not modified the remote oil fill lines, they planned to maintain the same administrative controls over their use as described in their previous evaluation for continued safe operation (Section F1.1).

Plant Support

- Using Temporary Instruction 2515/134, "Licensee Onshift Dose Assessment Capabilities," the inspectors determined that the licensee had the capability to perform onshift dose assessment using real-time effluent monitor and meteorological data.

Report Details

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On November 22, 1996, operators rapidly reduced power to 78 percent to address decreasing condenser vacuum caused by the presence of a large number of fish (shad) at the intake structure, which resulted in clogging the circulating water pump traveling screens. The plant was returned to full power on November 23. On December 20, operators experienced another shad run and reduced power to 90 percent. Power was returned to 100 percent later that evening, where it remained throughout the inspection period.

Unit 2 began the inspection period at 98 percent power. On November 16, 1996, operators commenced a reactor shutdown in response to an increase in primary-to-secondary leakage detected in Steam Generator B. The plant was cooled down and Mode 5 was entered on November 18. Following the completion of inspection and repairs on both steam generators, operators conducted a plant startup and entered Mode 1 on December 17. Reactor power was increased to 96 percent on December 20, where it remained throughout the inspection period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors reviewed ongoing plant operations. In general, the conduct of operations was professional and safety conscious; specific events and noteworthy observations are detailed below:

O1.2 Unit 2 - Plant Shutdown Due to Increased Primary-to-Secondary Leakage

a. Inspection Scope (71707)

On November 14, 1996, the licensee identified an increase in a primary-to-secondary leak rate in Unit 2 Steam Generator B from 1.15 gallons per day (gpd) to 15 gpd. The inspectors monitored the licensee's response to this indication and assessed their response.

b. Observations and Findings

On November 14, 1996, the licensee noted that an N-16 monitor on Main Steamline B indicated an increase in a primary-to-secondary leak rate from approximately 1.15 gpd to approximately 15 gpd. Analysis of secondary samples taken at the condenser vacuum pumps, the main steam lines, and the condensate system indicated a much lower leak rate, approximately 4 gpd. The licensee concluded that, although the magnitude of the leak rate as indicated by an N-16 monitor may not be accurate, it did reflect an accurate trend which revealed that an increase in leakage had occurred.

In response to the indications of a primary-to-secondary leak, the licensee increased the frequency of condenser off-gas sampling from once per week to 3 times per week and analysis of steam generator blowdown samples once per shift. Night orders were issued which served as the action plan to address the increase in leakage. Topics covered included increasing the frequency of chemistry sampling and the abnormal operating procedure guidance for initiating a plant shutdown in the event the leak rate increased. The licensee's Technical Specification limit for primary-to-secondary leakage is 0.5 gallons per minute (gpm), and the procedural limit contained in their abnormal operating procedure is 0.1 gpm.

On November 16, the licensee determined that the primary-to-secondary leak rate in Steam Generator B had increased to 40 - 60 gpd and decided to shut the plant down to locate and repair the leaking steam generator tube. The plant was cooled down and Mode 5 was entered on November 18. In response to the steam generator tube leak and the subsequent plant shutdown, the NRC dispatched inspectors to assess the licensee's steam generator inspection and repair effort. The results of this inspection are documented in NRC Inspection Report 50-313/96-28; 50-368/96-28.

c. Conclusions

The inspectors concluded that the licensee responded appropriately to the indications of increasing primary-to-secondary leakage in Steam Generator B. The licensee's decision to shutdown the plant, when the leak rate increased to 40 - 60 gpd, which was well below the limit contained in Technical Specifications and the abnormal operating procedure, indicated a conservative operating philosophy.

01.3 Unit 2 - Reactor Coolant System (RCS) Drain to Reduced Inventory

a. Inspection Scope (71707)

The inspectors observed Unit 2 operators drain the RCS to reduced inventory for steam generator inspections.

b. Observations and Findings

On November 19, 1996, operators drained the RCS for steam generator inspections and repair. The licensee performed a satisfactory infrequently performed test of evolution brief for this evolution. The inspectors noted that the operators followed Procedure 2103.011, "Draining the Reactor Coolant System," while removing water from the RCS and maintained the RCS temperature. Operators monitored the removal of RCS inventory and drained the RCS in a deliberate manner.

c. Conclusions

The inspectors concluded that the drain to midloop was well controlled.

01.4 Unit 1 - Increase in Primary-To-Secondary Leakage

a. Inspection Scope (71707)

On November 30, 1996, the licensee noted an increase in primary-to-secondary leakage in Steam Generator B. The inspectors assessed the licensee's response to this indication.

b. Observations and Findings

On November 30, 1996, Unit 1 operators noted a slight increase in the calculated RCS leak rate and observed an increase in primary-to-secondary leakage as indicated by the main steamline N-16 monitor and the condenser off-gas monitor. Secondary chemistry samples revealed that the magnitude of the primary-to-secondary leakage was approximately 50 gpd, up from 14 gpd. Unit 1 Technical Specifications required a plant shutdown if primary-to-secondary leakage exceeded 500 gpd and the licensee had a procedural limit of 0.1 gpm (144 gpd).

The licensee initiated several actions in response to the increase in primary-to-secondary leakage. Chemistry sampling and analysis of the main steam line, condenser off-gas, and the condensate system were performed hourly. The shift engineer was tasked with trending the leak rate based on the results of the chemistry samples. In addition, the licensee took actions to obtain more accurate N-16 monitors to better assess the leakage. During shift turnovers observed by the inspectors, the operators were briefed on the leakage and instructed to review the applicable procedures for responding to steam generator tube leakage and a tube rupture. In addition, licensee management determined that they would initiate a plant shutdown if the leak rate exceeded 100 gpd.

Based on the results of the secondary chemistry samples and the indications provided by the main steamline N-16 monitor, the licensee believed that the most probable source of the primary-to-secondary leakage was a leaking steam generator tube plug. By December 3, the leak rate had stabilized between 60 - 80 gpd. Several days later, the licensee noted a downward trend in the leak rate and, by the end of the inspection period, the leak rate had stabilized at approximately 30 gpd, although there was a large amount of variance in the quantification. The licensee was unable to explain the cause for the decreasing trend.

c. Conclusions

Unit 1 operators demonstrated a good questioning attitude in response to a slight increase in the RCS leak rate and identified an increase in primary-to-secondary leakage. The licensee established an aggressive sampling frequency to monitor the leakage and took other actions to improve their assessment of the leakage. Although the leak rate apparently decreased from approximately 80 gpd to 30 gpd, the licensee continued to closely monitor the leakage.

01.5 Unit 2 - Precritical Containment Closure

a. Inspection Scope (71707)

On December 15, 1996, the inspectors observed the operations department perform a precritical walkdown and closure of the containment in accordance with Procedure 1015.36, "Containment Building Closeout."

b. Observations and Findings

The inspectors observed the licensee's inspection and closeout of the containment building conducted with the plant at normal operating pressure and temperature. Structural integrity, cleanliness, and valve leakage were the primary focus of the inspection.

Personnel performing this activity were qualified and well trained. This was evident in the method of inspection, attention to detail, and familiarity with component locations.

The general cleanliness and structural integrity of the containment were acceptable and within the guidelines of the procedure. Noted deficiencies were properly dispositioned with job requests or engineering action requests. All work was performed per approved procedures. Appropriate radiological precautions and ALARA practices were observed.

c. Conclusions

Containment closure was thorough and complete with the proper focus on structural and systems integrity. Deficiencies identified during the walkdown were properly dispositioned.

01.6 Unit 2 - Plant Startup

a. Inspection Scope (71707)

On December 16 and 17, 1996, the inspectors observed the reactor and turbine startup that was conducted following completion of the Unit 2 forced outage. This evolution was performed over two shifts.

b. Observations and Findings

In lieu of training all shifts in anticipation of the startup, a special team of licensed operators was selected and trained to perform the reactor startup. Special training was also conducted for the shift performing the turbine startup. This resulted in well briefed shifts and teams sensitive to all of the startup requirements set forth in Procedure 2102.016, "Reactor Startup." In addition to the shift brief, an additional

Brief was provided by the startup team to the crew to aid in integration of crew activities during both the reactor and turbine startup. All briefs were thorough and complete. Additionally, operators emphasized the use of peer checks during the evolutions.

During the reactor startup, shift supervision demonstrated appropriate concerns and cautioned personnel to be alert, noting that this was the first midwatch after a period of time off. A safe, slow, and methodical startup was emphasized.

The approach to criticality was performed in a safe and methodical manner. The startup was discontinued during periods where nuisance annunciators were causing potential distractions. Appropriate Technical Specifications were applied during the failure of one channel of the core protection calculator, which was the only safety-related instrument failure that occurred.

The inspectors observed consistent use of three-way communications and peer checks by operators. Reactor engineers provided appropriate support during the approach to criticality.

c. Conclusions

Operator performance was properly focused on safety with adherence to procedures, Technical Specifications, and other requirements. Personnel demonstrated a strong attention to detail and concern for safe operations as evident by peer checks and additional briefings. Deficiencies were properly identified and addressed by supervisory and support personnel.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Unit 2 - Breaker Latch Roller Bearing Replacement

a. Inspection Scope (62707)

On November 17, 1996, with Unit 2 in Mode 3, operators were unsuccessful in securing Reactor Coolant Pump (RCP) 2P-32A from the control room. An auxiliary operator was dispatched to open the breaker locally. The licensee determined that the most probable cause of the failure of the breaker to open was grease hardening, which resulted in the binding of the breaker's trip latch roller bearing.

The licensee's corrective actions for similar failures of General Electric Magne-Blast circuit breakers on Units 1 and 2 were to replace the trip latch roller bearings on all breakers using a different grease recommended by General Electrical. The Unit 1

bearing replacements were completed during the last refueling outage and the Unit 2 work had been scheduled to be performed during the next refueling outage scheduled for April 1997.

As a result of the failure of the Unit 2 RCP breaker to open during the plant shutdown, the licensee decided to begin replacement of the trip latch roller bearings while the plant was shutdown for the repair of the steam generator tube leak. During the forced outage, the licensee replaced the bearings on 46 breakers and scheduled the replacement of bearings in an additional 11 breakers to be completed by March 31, 1997. This equipment malfunction is unresolved pending review with respect to maintenance rule aspects (50-368/96008-01).

On December 5, 1996, the inspectors observed technicians replace the trip latch roller bearing on High Pressure Safety Injection Pump 2P-89B Motor Breaker 2A-406. The work was performed in accordance with Job Order 00956896.

b. Observations and Findings

The inspectors found that the technicians were very knowledgeable on the performance of the task and replaced the bearing in accordance with the job order using the proper grease. The inspectors observed that the job order lacked detailed instructions for the replacement of the latch roller bearing. The licensee stated that a small dedicated group of technicians performed this activity and had received specialized training. As a result, the licensee believed that the activity was within the skill of the craft. The inspectors observed that the task did appear to be within the skill of the craft for those technicians observed during this maintenance task.

c. Conclusions

The licensee's decision to replace trip latch roller bearings on the Unit 2 General Electric Magne-Blast breakers sooner than originally planned was prudent, given the failure of the RCP breaker to open due to grease hardening. The bearing replacement observed by the inspectors was well executed.

M1.2 Unit 1 - Preventive Maintenance on Valve CV-1250

a. Inspection Scope (62707)

The inspectors observed all or portions of the following work activities associated with Job Order 00951482, "Clean and Inspect CV-1250, Condensate/Boric Acid Block valve operator," observed on December 2, 1996.

b. Observations and Findings

The inspectors observed that the workers followed the job order instructions, exhibited good radworker practices, and were knowledgeable on the equipment. The workers

obeyed radiation protection requirements and job instructions. Workers noted that the air actuator was leaking slightly. Since the actuator is usually closed and is not required to open, the licensee did not choose to fix the leak. The licensee intends to fix the valve actuator if it degrades further and plans to fix the actuator during performance of the next preventive maintenance. The inspectors concluded that, since the valve is not required to open, not fixing the leak rate did not result in valve inoperability.

c. Conclusions

The inspectors concluded that the licensee's workers were knowledgeable, followed their procedures, and showed good worker practices.

M1.3 General Comments on Surveillance Activities

a. Inspection Scope (61726)

The inspectors observed all or portions of the following surveillance activity:

- Procedure 1304.208, "Unit 1 EFIC Channel D Monthly Test, SG Pressure > 750 psig," observed on December 18, 1996.

b. Observations and Findings

The measuring and test equipment used was within its current calibration cycle, the technicians were knowledgeable and followed the procedure, and the surveillance results were acceptable.

c. Conclusions

The inspectors concluded that the licensee's technicians were knowledgeable and followed their procedures.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Unsecured Material

a. Inspection Scope (62707)

Inspectors walked down the plant systems and noted the general plant configuration. The inspectors focused on the general material condition of the plant. The inspectors also reviewed Procedure 5010.008, "Review of Potentially Hazardous Seismic Category II/I Situations."

b. Observations and Findings

The inspectors found numerous examples of unsecured equipment and components in both units. As an example, there were several unsecured portable eyewash canisters and pump assemblies located in the Units 1 and 2 auxiliary buildings. Also, there were several air sampling pumps which were hanging from the support via plastic straps or ropes. There were also several unsecured ladders in different parts of the facility. Although not all components were in the immediate vicinity of safety-related components, some were in the general vicinity of components important to safety. There was an 8-foot unsecured scaffolding pipe in the immediate vicinity of the Unit 1 high pressure safety injection system.

The inspectors questioned that these unsecured components could potentially threaten the operability of vital and safety-related systems in a seismic event. Although Procedure 5010.008 provided guidance for design phase and installation of modification packages, it did not provide direction for controlling the material operationally.

The licensee considered that none of the examples listed above presented operability concerns. The licensee planned to evaluate their procedural and administrative controls.

c. Conclusions

The inspectors concluded the administrative and procedural controls for material in the plant were weak.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Review of Updated Safety Analysis Report (USAR) Commitments

A recent discovery of a licensee operating their facility in a manner contrary to the USAR description highlighted the need for a special focused review that compares plant practices, procedures, and/or parameters to the USAR description. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the USAR that related to the areas inspected. No discrepancies were found between the wording of the USAR and the plant practices, procedures, and/or parameters observed by the inspectors.

E2.2 Fuel Selection

a. Inspection Scope

Inspectors reviewed the selection of fuel assembly burnup to meet the design requirement for the dry cask loading.

b. Observations and Findings

The inspectors found that the results of the gamma scanning of the 24 fuel assemblies which were loaded in the first dry cask showed a spectrum of burnup values from 15,800 to 19,902 MWD/MT of uranium. The Certificate of Compliance limited maximum exposure to 35,000 MWD/MT of uranium.

c. Conclusions

The inspectors concluded that the fuel assemblies met the exposure requirements of the Certificate of Compliance.

IV. Plant Support

P3 Emergency Preparedness Procedures and Documentation

P3.1 Licensee Onshift Dose Assessment Capabilities (TI 2515/134)

a. Inspection Scope

Using Temporary Instruction 2515/134, the inspectors gathered information regarding:

- Dose assessment commitment in an emergency plan
- Onshift dose assessment emergency plan implementing procedure
- Onshift dose assessment training

The following documents were reviewed during this inspection:

Emergency Plan Implementing Procedures

- Procedure 19C3.064, Revision 6, "Emergency Response Facility - Response Facility - Control Room"
- Procedure 1904.010, Revision 1, "Duties of Initial Dose Assessor"
- Procedure 1904.002, Revision 27, Procedure Change 3, "Offsite Dose Projections RDACS Computer Method"

Other Documents

Arkansas Nuclear One Emergency Plan, Revision 20

This information will be distributed to and evaluated by NRC headquarters personnel.

b. Observations and Findings

On November 13, 1996, the inspectors conducted an inoffice review of the emergency plan and implementing procedures to obtain the information requested by the temporary instruction. The inspectors conducted a telephone interview with the licensee on November 14, 1996, to verify the results of the review. Based on the documentation review and the licensee interview, the inspectors determined that the licensee had the capability to perform onshift dose assessments using real-time effluent monitor and meteorological data. The inspectors found that the licensee's commitment to provide a person on shift to perform this dose assessment was not clearly described in the emergency plan and implementing procedures.

c. Conclusions

The inspector concluded that the licensee had the capability to perform dose assessments using real-time data. Emergency plan and implementing procedures did not clearly describe this capability.

F1 Control of Fire Protection Activities

F1.1 Unit 2 - Walkdown of Modifications to the RCP Oil Collection System

a. Inspection Scope (37551, 92904)

Following a small fire in the Unit 1 reactor building on October 17 and the subsequent identification of deficiencies in the Unit 1 RCP oil collection system, the inspectors had conducted a walkdown of a spare Unit 2 RCP motor located outside of containment and found potential deficiencies in the oil collection system. These deficiencies were confirmed by the licensee and NRC inspectors during a walkdown of the system inside containment following the forced shutdown of Unit 2 due to the steam generator tube leak. (See NRC Inspection Report 50-313/96-27; 50-368/96-27 for results of the special inspection conducted in response to the Unit 1 fire.) The licensee developed modifications to correct the Unit 2 RCP motor oil collection system deficiencies and installed these modifications during the forced outage. On December 10, 1996, the inspectors conducted a postmodification walkdown of the four RCPs and their associated oil collection systems inside the Unit 2 containment building.

b. Observations and Findings

The inspectors observed that the licensee had installed drip trays and covers in areas around the RCP motors that previously lacked a collection method to protect against oil leakage and spray. Although some modifications were made to portions of the remote fill lines, the licensee did not provide full protection along the entire length of the lines. The inspectors determined that the modifications made to the Unit 2 RCP oil collection system, with the exception of the remote fill lines, were sufficient to address previously identified deficiencies in these areas. The licensee planned to maintain strict administrative controls on the use of the remote fill lines in accordance with their previously developed evaluation for continued safe operation. The inspectors observed that, while most of the modifications were substantial and permanent, a small portion of the modification appeared to be temporary. Specifically, the inspectors observed the use of caulking material on surfaces of the RCP motor casing to act as a dam to divert oil leakage to an existing drip pan. These dams were added following the licensee's own postmodification walkdown to address potential flowpaths for leaking oil. The licensee indicated they plan to evaluate more permanent modifications for these areas.

c. Conclusions

The inspectors concluded that the modifications made to the Unit 2 RCP motor oil collection system were sufficient to address previously identified deficiencies in these areas. Although the licensee had not modified the remote oil fill lines, they planned to maintain the same administrative controls over their use as described in their previous evaluation for continued safe operation.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Anderson, Unit 2 Plant Manager
T. Brown, Unit 1 Project Manager Outages
M. Cooper, Licensing Specialist
P. Dietrich, Superintendent, Unit 1 Mechanical Maintenance
R. Edington, General Manager Plant Operations
D. Eichenberger, Technical Assistant, Maintenance
R. Fuller, Unit 1 Acting Operations Manager
R. Hutchinson, Vice President, Operations
R. Lane, Director, Design Engineering
D. McKenney, Acting Manager, Unit 1 System Engineering
D. Mims, Director, Nuclear Safety
T. Mitchell, Manager, Unit 2 System Engineering
T. Morrison, Supervisor, Modification Central Support
M. Smith, Supervisor, Licensing
A. South, Assessment Technical Specialists and Engineers
H. Williams, Jr., Superintendent, Plant Security

NRC

K. Kennedy, Senior Resident Inspector
J. Melfi, Resident Inspector

INSPECTION PROCEDURES USED

37551	Onsite Engineering
61726	Surveillance Observations
62707	Maintenance Observations
71707	Plant Operations
92904	Followup - Plant Support
TI 2515/134	Licensee Onshift Dose Assessment Capabilities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-368/96008-01 URI RCP Motor Breaker Failure to Open on Demand