



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

July 28, 2016

Clay Warren, Acting Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
1448 SR 333
Russellville, AR 72802-0967

SUBJECT: ARKANSAS NUCLEAR ONE – NRC INSPECTION REPORT 05000313/2016002
and 05000368/2016002

Dear Mr. Warren:

On June 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Arkansas Nuclear One facility, Units 1 and 2. On July 5, 2016, the NRC inspectors discussed the results of this inspection with Mr. J. Browning and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. These findings did not involve a violation of NRC requirements. Further, inspectors documented a licensee-identified violation which was determined to be of very low safety significance in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the NRC Enforcement Policy.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC resident inspector at Arkansas Nuclear One.

If you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region IV; and the NRC resident inspector at Arkansas Nuclear One.

On June 30, 2016, the NRC completed a quarterly performance review of Arkansas Nuclear One. The NRC determined that continued plant operation was acceptable and oversight in the Multiple/Repetitive Degraded Cornerstone of the Reactor Oversight Process Action Matrix remained appropriate.

C. Warren

- 2 -

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Neil O'Keefe, Branch Chief
Project Branch E
Division of Reactor Projects

Docket Nos. 50-313 and 50-368
License Nos. DRP-51 and NPF-6

Enclosure:
Inspection Report 05000313/2016002
and 05000368/2016002
w/ Attachment: Supplemental Information

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Neil O'Keefe, Branch Chief
Project Branch E
Division of Reactor Projects

Docket Nos. 50-313 and 50-368
License Nos. DRP-51 and NPF-6

Enclosure:
Inspection Report 05000313/2016002
and 05000368/2016002
w/ Attachment: Supplemental Information

DISTRIBUTION:
See next page

ADAMS ACCESSION NUMBER: ML16211A184

<input checked="" type="checkbox"/> SUNSI Review By: NFO		ADAMS <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<input checked="" type="checkbox"/> Non-Sensitive <input type="checkbox"/> Sensitive		<input checked="" type="checkbox"/> Publicly Available <input type="checkbox"/> Non-Publicly Available	
OFFICE	SRI:DRP/E	RI:DRP/E	RI:DRP/E	DRS/EB1	DRS/EB2	DRS/OB	
NAME	BTindell	ABarrett	MTobin	TRFarnholtz	GWerner	VGaddy	
SIGNATURE	<i>/RA/</i>	<i>/RA/</i>	<i>/RA/</i>	<i>/RA/</i>	<i>/RA/</i>	<i>/RA/</i>	
DATE	07/26/16	7/27/16	7/26/16	7/26/16	07/26/16	7/27/16	
OFFICE	DRS/PSB2	DRS/IPST	BC/DRP/E				
NAME	HGepford	THipschman	NO'Keefe				
SIGNATURE	<i>/RA/</i>	<i>/RA/</i>	<i>/RA/</i>				
DATE	7/26/16	7/25/16	7/27/16				

ORIGINAL RECORD COPY

Letter to Clay Warren from Neil O'Keefe dated July 28, 2016

SUBJECT: ARKANSAS NUCLEAR ONE – NRC INTEGRATED INSPECTION REPORT
05000313/2016002 and 05000368/2016002

DISTRIBUTION:

Regional Administrator (Kriss.Kennedy@nrc.gov)
Deputy Regional Administrator (Scott.Morris@nrc.gov)
DRP Director (Troy.Pruett@nrc.gov)
DRS Director (Anton.Vegel@nrc.gov)
DRS Deputy Director (Jeff.Clark@nrc.gov)
DRP Deputy Director (Ryan.Lantz@nrc.gov)
Senior Resident Inspector (Brian.Tindell@nrc.gov)
Resident Inspector (Margaret.Tobin@nrc.gov)
Resident Inspector (Andy.Barrett@nrc.gov)
Branch Chief, DRP/E (Neil.OKeefe@nrc.gov)
Senior Project Engineer, DRP/E (John.Dixon@nrc.gov)
Project Engineer, DRP/E (Brian.Correll@nrc.gov)
Project Engineer, DRP/E (Jackson.Choate@nrc.gov)
Administrative Assistant (Mary.Bennett@nrc.gov)
Public Affairs Officer (Victor.Dricks@nrc.gov)
Project Manager (Stephen.Koenick@nrc.gov)
Team Leader, DRS/TSS (Thomas.Hipschman@nrc.gov)
ACES (R4Enforcement.Resource@nrc.gov)
RITS Coordinator (Marisa.Herrera@nrc.gov)
Regional Counsel (Karla.Fuller@nrc.gov)
Technical Support Assistant (Loretta.Williams@nrc.gov)
Congressional Affairs Officer (Jenny.Weil@nrc.gov)
RIV Congressional Affairs Officer (Angel.Moreno@nrc.gov)
RIV/ETA: OEDO (Jeremy.Bowen@nrc.gov)
RIV RSLO (Bill.Maier@nrc.gov)
ROPreports.Resource@nrc.gov
ROPassessment.Resource@nrc.gov

**U.S. NUCLEAR REGULATORY COMMISSION
REGION IV**

Docket: 05000313; 05000368

License: DPR-51; NPF-6

Report: 05000313/2016002; 05000368/2016002

Licensee: Entergy Operations, Inc.

Facility: Arkansas Nuclear One, Units 1 and 2

Location: Junction of Highway 64 West and Highway 333 South
Russellville, Arkansas

Dates: April 1 through June 30, 2016

Inspectors: B. Tindell, Senior Resident Inspector
A. Barrett, Resident Inspector
M. Tobin, Resident Inspector

Approved By: Neil O'Keefe
Chief, Project Branch E
Division of Reactor Projects

SUMMARY

IR 05000313/2016002; 05000368/2016002; 04/01/2016 – 06/30/2016; Arkansas Nuclear One, Units 1 and 2, Integrated Inspection Report; Maintenance Effectiveness, Problem Identification and Resolution.

The inspection activities described in this report were performed between April 1 and June 30, 2016, by the resident inspectors at Arkansas Nuclear One. Two findings of very low safety significance (Green) are documented in this report. None of these findings involved violations of NRC requirements. Additionally, NRC inspectors documented a licensee-identified violation of very low safety significance. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using Inspection Manual Chapter 0609, "Significance Determination Process." Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

Cornerstone: Initiating Events

- Green. The inspectors identified a finding for the failure to incorporate vendor instructions in a work order. Specifically, the licensee exceeded the vendor specified torque values and performed the work with the component in service, contrary to vendor cautions, breaking the glass, wetting the auxiliary feedwater pump, and necessitating the unplanned shutdown of the main feedwater pump. The licensee replaced the ruptured sight glass and repaired and tested the wetted components. The licensee documented the issue in Condition Report CR-ANO-2-2015-04832.

The failure to incorporate vendor instructions in a work order is a performance deficiency. The finding is more than minor because it adversely affected the procedure quality attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the reliability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the performance deficiency resulted in the Unit 2 auxiliary feedwater pump and main feedwater pump B being rendered unavailable. The inspectors evaluated the finding with NRC Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions." The inspectors determined that the finding required a detailed risk evaluation because the finding involved an actual loss of function of auxiliary feedwater and one train of main feedwater, designated as having high safety significance in accordance with the licensee's maintenance rule program, for greater than 24 hours. A senior reactor analyst performed a detailed risk evaluation and determined that the increase in core damage frequency was $1.3E-7$ /year (Green). The analyst assumed that all feedwater pumps were available until the time of the leak and that any increase in core damage frequency resulted from the unavailability of the pumps after the leak. The emergency feedwater system remained available to mitigate the increase in core damage frequency of this finding. The inspectors determined this finding has a cross-cutting aspect in the human performance area of Work Management because the primary cause of the performance deficiency involved the failure to identify and manage risk commensurate to the work and the need for coordination with different groups or job activities (Section 1R12).

[H.5]

Cornerstone: Mitigating Systems

- Green. The inspectors documented a self-revealing finding for failure to clean the main feedwater turbine lube oil reservoir. Specifically, the main feedwater turbine lube oil reservoir had not been cleaned since 2006, causing clogged filters and low main feedwater turbine bearing oil pressure on February 5, 2016. The licensee entered this finding into their corrective action program as Condition Report CR-ANO-2-2016-00470 and implemented the necessary preventive maintenance.

The failure to perform preventive maintenance to ensure cleanliness on the main feedwater pump turbine bearing oil reservoir as required by the preventive maintenance program is a performance deficiency. The performance deficiency is more than minor because it impacted the equipment performance attribute and adversely affected the initiating events cornerstone objective to limit the likelihood of events that upset plant stability and challenged critical safety functions during shutdown as well as power operations. Specifically, the performance deficiency resulted in operators lowering reactor power and rendered a main feedwater pump unavailable. Using NRC Inspection Manual Chapter 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, the inspectors screened the finding as having very low safety significance because the finding affected a transient initiator but did not result in a reactor trip. The inspectors determined that this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance. Specifically, the maintenance strategy changed in 2009 (Section 4OA2.2).

Licensee-Identified Violations

A violation of very low safety significance that was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and associated corrective action tracking numbers are listed in Section 4OA7 of this report.

PLANT STATUS

Unit 1 operated at 100 percent power for the entire inspection period.

Unit 2 began the period at 100 percent power. On May 26, 2016, operators reduced power to approximately 10 percent reactor power and removed the main turbine from service to repair an electrohydraulic control fluid leak associated with the turbine controls. On May 27, 2016, the plant returned to 100 percent power and remained at 100 percent power through the end of the inspection period.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdown

a. Inspection Scope

The inspectors performed partial system walk-downs of the following risk-significant systems:

- June 9, 2016, Units 1 and 2, alternate ac diesel generator jacket water June 24, 2016, Unit 2, emergency diesel generator B electrical lineup
- June 28, 2016, Unit 2, turbine driven emergency feedwater valve lineup

The inspectors reviewed the licensee's procedures and system design information to determine the correct lineup for the systems. They visually verified that critical portions of the systems were correctly aligned for the existing plant configuration.

These activities constituted three partial system walk-down samples as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Quarterly Inspection

a. Inspection Scope

The inspectors evaluated the licensee's fire protection program for operational status and material condition. The inspectors focused their inspection on four plant areas important to safety:

- June 9, 2016, Units 1 and 2, Fire Zone NA, alternate ac diesel generator building
- June 23, 2016, Unit 2, Fire Zone 2154-E, control element drive mechanism room
- June 24, 2016, Unit 2, Fire Zone 2094-Q, emergency diesel generator B
- June 28, 2016, Unit 1, Fire Zone 97-R, cable spreading room

For each area, the inspectors evaluated the fire plan against defined hazards and defense-in-depth features in the licensee's fire protection program. The inspectors evaluated control of transient combustibles and ignition sources, fire detection and suppression systems, manual firefighting equipment and capability, passive fire protection features, and compensatory measures for degraded conditions.

These activities constituted four quarterly inspection samples, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

On May 16, 2016, the inspectors completed an inspection of the station's ability to mitigate flooding due to internal causes. After reviewing the licensee's flooding analysis, the inspectors chose the Units 1 and 2 diesel fuel oil storage vault, which contains risk-significant structures, systems, and components (SSCs) susceptible to flooding.

The inspectors reviewed plant design features and licensee procedures for coping with internal flooding. The inspectors walked down the selected areas to inspect the design features, including the material condition of seals, drains, and flood barriers. The inspectors evaluated whether operator actions credited for flood mitigation could be successfully accomplished.

These activities constitute completion of one flood protection measures sample, as defined in Inspection Procedure 71111.06.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11)

.1 Review of Licensed Operator Requalification

a. Inspection Scope

The inspectors observed simulator testing and training for licensed operators. The inspectors assessed the performance of the operators and the evaluators' critique of their performance. The inspectors also assessed the modeling and performance of the simulator during the requalification activities.

- May 17, 2016, Unit 1, evaluated simulator scenario performed by operating crew
- May 18, 2016, Unit 2, simulator training for operating crew

These activities constitute completion of two quarterly licensed operator requalification program samples, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

The inspectors observed the performance of on-shift licensed operators in the Units 1 and 2 main control rooms. At the time of the observations, the plants were in a period of heightened activity and risk. The inspectors observed the operators' performance of the following activities:

- May 26, 2016, Unit 2, control room observation of operators connecting the main turbine to the grid
- June 29, 2016, Unit 1, control room observation of emergency diesel generator monthly surveillance

In addition, the inspectors assessed the operators' adherence to plant procedures, including the conduct of operations procedure and other operations department policies.

These activities constitute completion of two quarterly licensed operator performance samples, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed one instance of degraded performance or condition of SSCs:

- June 6, 2016, Unit 2, main feedwater seal cooling sight glass failure

The inspectors reviewed the extent of condition of possible common cause SSC failures and evaluated the adequacy of the licensee's corrective actions. The inspectors reviewed the licensee's work practices to evaluate whether these may have played a role in the degradation of the SSCs. The inspectors assessed the licensee's characterization of the degradation in accordance with 10 CFR 50.65 (the maintenance rule), and verified that the licensee was appropriately tracking degraded performance and conditions in accordance with the maintenance rule.

These activities constituted completion of one maintenance effectiveness sample, as defined in Inspection Procedure 71111.12.

b. Findings

Introduction. The inspectors identified a Green finding for the failure to incorporate vendor instructions in a work order. Specifically, the licensee exceeded the vendor specified torque values and performed the work with the component in service, contrary to vendor cautions, breaking the glass, wetting the auxiliary feedwater pump, and necessitating the unplanned shutdown of the main feedwater pump.

Description. On November 16, 2015, during power ascension at the end of a refueling outage, Unit 2 was operating at 68 percent power with both main feedwater pumps in operation. Operations personnel documented leakage from the sight glass for Unit 2 main feedwater pump B seal cooling in Condition Report CR-ANO-2-2015-04821. On the same day, maintenance personnel attempted to tighten the sight glass fasteners to stop the leakage. While it was being tightened, the sight glass ruptured and seal cooling water began spraying out. Operators secured main feedwater pump B due to concerns about loss of seal cooling water flow and isolated the leak. Throughout the event, main feedwater pump A continued to supply feedwater and reactor power remained stable. The licensee documented the sight glass rupture in Condition Report CR-ANO-2-2015-04832, replaced the sight glass, and restarted the main feedwater pump 43 hours after the event. The spray from the sight glass wetted the non-safety but risk-significant Unit 2 auxiliary feedwater pump. Operators disabled the auxiliary feedwater pump until the motor dried and maintenance personnel tested the motor insulation satisfactorily, 57 hours after the event.

The licensee subsequently discovered that the component database listed the incorrect model for the sight glass, as documented in Condition Report CR-ANO-2-2015-04859. The incorrect model information led planners to specify excessive torque values, which contributed to the sight glass rupture. The torque applied was 62 ft-lbs, while Vendor Drawing M-2001-1 specified 6 ft-lbs as the maximum torque for the sight glass fasteners.

Procedure EN-WM-105, "Planning," Revision 16, Step 5.3[1]d(1), required planners to utilize vendor manuals to get an understanding of the equipment, its function, and operational characteristics. The inspectors reviewed Vendor Manual TD0010010, "Installation, Operating, and Maintenance Instructions for Jacoby-Tarbox Full-View Sight Flow Indicators," Revision 1. The vendor manual cautioned users several times to take the sight glass out of service before tightening fasteners because glass is brittle and could fail catastrophically. The inspectors concluded that the licensee failed to consider and incorporate the vendor manual's instructions, which contributed to the sight glass failure, tripping main feedwater pump B, and wetting the auxiliary feedwater pump.

Analysis. The failure to incorporate vendor instructions in a work order is a performance deficiency. The finding is more than minor because it adversely affected the procedure quality attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the reliability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the performance deficiency resulted in the Unit 2 auxiliary feedwater pump and main feedwater pump B being rendered unavailable. The inspectors evaluated the finding with NRC Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for

Findings At-Power,” dated June 19, 2012, Exhibit 2, “Mitigating Systems Screening Questions.” The inspectors determined that the finding required a detailed risk evaluation because the finding represented an actual loss of function of auxiliary feedwater and one train of main feedwater, designated as having high safety significance in accordance with the licensee’s maintenance rule program, for greater than 24 hours.

A senior reactor analyst performed a detailed risk evaluation and determined that the increase in core damage frequency was 1.3E-7/year (Green). The analyst assumed that all feedwater pumps were available until the time of the leak and that any increase in core damage frequency resulted from the unavailability of the pumps after the leak. The auxiliary feedwater pump and a main feedwater pump were assumed to be out of service concurrently for 43 hours. The auxiliary feedwater pump was then assumed to be out of service for an additional 14 hours beyond that. The analyst used Version 8.26 of the SPAR model for Arkansas Nuclear One, Unit 2, using SAPHIRE Version 8.1.4 to estimate the results. The dominant core damage sequences were losses of safety-related electrical bus 2A3 and losses of motor control centers 2B5 and 2B6. The emergency feedwater system remained available to mitigate the increase in core damage frequency of this finding.

The inspectors determined this finding has a cross-cutting aspect in the human performance area of H.5, Work Management, because the primary cause of the performance deficiency involved the failure to identify and manage risk commensurate to the work and the need for coordination with different groups or job activities.

Enforcement. This finding did not involve enforcement action because no regulatory requirements were violated. The licensee documented the issue in Condition Report CR-ANO-2-2015-04832. The licensee replaced the ruptured sight glass and repaired and tested the wetted components. FIN 05000368/2016002-01 “Failure to Incorporate Vendor Guidance in Work Order.”

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed two risk assessments performed by the licensee prior to changes in plant configuration and the risk management actions taken by the licensee in response to elevated risk:

- May 2, 2016, Units 1 and 2, diesel driven fire pump out of service
- June 10, 2016, Unit 2, emergency diesel generator B out of service

The inspectors verified that these risk assessments were performed timely and in accordance with the requirements of 10 CFR 50.65 (the maintenance rule) and plant procedures. The inspectors reviewed the accuracy and completeness of the licensee’s risk assessments and verified that the licensee implemented appropriate risk management actions based on the result of the assessments.

Additionally, on May 26, 2016, the inspectors observed portions of one emergent work activity, a Unit 2 reactor power reduction and main turbine shutdown for repair of an

electrohydraulic control fluid leak, that had the potential to cause an initiating event or to affect the functional capability of mitigating systems.

The inspectors verified that the licensee appropriately developed and followed a work plan for these activities. The inspectors verified that the licensee took precautions to minimize the impact of the work activities on unaffected SSCs.

These activities constitute completion of three maintenance risk assessments and emergent work control inspection samples, as defined in Inspection Procedure 71111.13.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

The inspectors reviewed six operability determinations that the licensee performed for degraded or nonconforming SSCs:

- April 11, 2016, Unit 1, operability determination for a service water leak through a pipe wall
- April 19, 2016, Units 1 and 2, operability determination for degraded breaker clips on ABB K-line breakers
- April 26, 2016, Unit 2, operability determination of degraded caulk seals on the containment roof
- April 26, 2016, Unit 2, operability determination of boric acid wastage on a pressurizer valve hanger
- May 12, 2016, Unit 2, operability determination of missing service water strainer bolts
- May 20, 2016, Unit 2, operability determination of check valve leakage affecting safety injection tank level

The inspectors reviewed the timeliness and technical adequacy of the licensee's evaluations. Where the licensee determined the degraded SSC to be operable, the inspectors verified that the licensee's compensatory measures were appropriate to provide reasonable assurance of operability. The inspectors verified that the licensee had considered the effect of other degraded conditions on the operability of the degraded SSC.

These activities constitute completion of six operability and functionality review samples, as defined in Inspection Procedure 71111.15.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed two post-maintenance testing activities that affected risk-significant SSCs:

- April 15, 2016, Unit 1, electric fire pump test following rewind of motor
- June 10, 2016, Unit 2, emergency diesel generator B following overhaul

The inspectors reviewed licensing- and design-basis documents for the SSCs and the maintenance and post-maintenance test procedures. The inspectors observed the performance of the post-maintenance tests to verify that the licensee performed the tests in accordance with approved procedures, satisfied the established acceptance criteria, and restored the operability of the affected SSCs.

These activities constitute completion of two post-maintenance testing inspection samples, as defined in Inspection Procedure 71111.19.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed five risk-significant surveillance tests and reviewed test results to verify that these tests adequately demonstrated that the SSCs were capable of performing their safety functions:

Reactor coolant system leak detection tests:

- June 2, 2016, Unit 1, reactor coolant system leakage detection
- June 3, 2016, Unit 2, reactor coolant system leakage detection

Other surveillance tests:

- April 21, 2016, Unit 2, waste control operator daily technical specification surveillances
- April 24, 2016, Units 1 and 2, alternate ac diesel generator
- April 26, 2016, Units 1 and 2, emergency cooling pond volume measurement

The inspectors verified that these tests met technical specification requirements, that the licensee performed the tests in accordance with their procedures, and that the results of the test satisfied appropriate acceptance criteria. The inspectors verified that the licensee restored the operability of the affected SSCs following testing.

These activities constitute completion of five surveillance testing inspection samples, as defined in Inspection Procedure 71111.22.

c. Findings

No findings were identified.

4. OTHER ACTIVITIES

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Security

40A1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures (MS05)

a. Inspection Scope

For the period of April 1, 2015, through March 31, 2016, the inspectors reviewed licensee event reports (LERs), maintenance rule evaluations, and other records that could indicate whether safety system functional failures had occurred. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, and NUREG-1022, "Event Reporting Guidelines: 10 CFR 50.72 and 50.73," Revision 3, to determine the accuracy of the data reported.

These activities constituted verification of the safety system functional failures performance indicator for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.2 Reactor Coolant System Specific Activity (BI01)

a. Inspection Scope

The inspectors reviewed the licensee's reactor coolant system chemistry sample analyses for the period of April 1, 2015, through March 31, 2016, to verify the accuracy and completeness of the reported data. The inspectors observed a chemistry technician obtain and analyze a reactor coolant system sample on April 11, 2016. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the reactor coolant system specific activity performance indicator for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.3 Reactor Coolant System Total Leakage (BI02)

a. Inspection Scope

The inspectors reviewed the licensee's records of reactor coolant system total leakage for the period of April 1, 2015, through March 31, 2016, to verify the accuracy and completeness of the reported data. The inspectors observed the performance of the Units 1 and 2 RCS leak detection surveillance procedures on April 1, 2016. The inspectors used definitions and guidance contained in Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the reported data.

These activities constituted verification of the reactor coolant system leakage performance indicator for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

40A2 Problem Identification and Resolution (71152)

.1 Routine Review

a. Inspection Scope

Throughout the inspection period, the inspectors performed daily reviews of items entered into the licensee's corrective action program and periodically attended the licensee's condition report screening meetings. The inspectors verified that licensee personnel were identifying problems at an appropriate threshold and entering these problems into the corrective action program for resolution. The inspectors verified that the licensee developed and implemented corrective actions commensurate with the significance of the problems identified. The inspectors also reviewed the licensee's problem identification and resolution activities during the performance of the other inspection activities documented in this report.

b. Findings

No findings were identified.

.2 Annual Follow-up of Selected Issues

a. Inspection Scope

The inspectors selected three issues for an in-depth follow-up:

- On April 26, 2016, the inspectors reviewed the licensee's evaluation for the November 12, 2015, Unit 2 reactor coolant system leak during post maintenance testing of the loop drain valves. The licensee isolated the leak by closing the upstream loop drain valve. (CR-ANO-2-2015-04744)
- On June 21, 2016, the inspectors reviewed the licensee's evaluation for the leakage from the Unit 2 safety injection tanks to the containment through the bonnet seal of high pressure safety injection check valve 2SI-13D. The licensee repaired the valve by cutting it out and replacing it. (CR-ANO-2-2016-00587)
- On June 20, 2016, the inspectors reviewed the licensee's evaluation for the February 5, 2016, Unit 2 power reduction and trip of a main feedwater pump due to low lube oil pressure. The licensee restored lube oil pressure by removing the failed O-ring material from the lube oil pressure control valves. (CR-ANO-2-2016-00470)

The inspectors assessed the licensee's problem identification threshold, cause analyses, extent of condition reviews, and compensatory actions. The inspectors verified that the licensee appropriately prioritized the corrective actions and that these actions were adequate to correct the condition.

These activities constitute completion of three annual follow-up samples as defined in Inspection Procedure 71152.

b. Findings

Introduction. The inspectors documented a self-revealing Green finding for the failure to periodically clean the main feedwater turbine lube oil reservoir. Specifically, the main feedwater turbine lube oil reservoir had not been cleaned since 2006, causing clogged filters and low main feedwater turbine bearing oil pressure.

Description. On February 5, 2016, the Unit 2 control room received an alarm for low main feedwater pump turbine bearing oil pressure. Operators identified that the in-service lube oil filter had high differential pressure and shifted lube oil filters to place a clean one into service. When this did not restore pressure, operators attempted to adjust the turbine bearing oil pressure control valve to restore normal pressure. When this was unsuccessful, operators lowered reactor power to 70 percent and removed the main feedwater pump from service. The licensee disassembled the pressure regulating valves and discovered pieces of a failed O-ring lodged inside the pressure regulating valves, which had blocked oil flow. The licensee removed the pieces of O-ring, which corrected the low turbine bearing oil pressure. The licensee restarted the main feedwater pump, and restored the plant to full power on February 10, 2016.

The licensee documented the low feedwater pump turbine bearing oil pressure issue in Condition Report CR-ANO-2-2016-00470 and conducted a root cause evaluation for the issue. The licensee identified that there was no longer a process for maintaining cleanliness of the main feedwater pump turbine lube oil reservoir. In the past, the main feedwater pump turbine bearing oil filters did not normally clog or need cleaning at power. However, Unit 2 operators needed to clean filters several times online since the last refueling outage ended in November 2015. The licensee

determined that the turbine bearing oil reservoir had not been cleaned since 2006, allowing dirt, water, and debris to accumulate. Entergy Procedure EN-DC-153, "Preventive Maintenance Component Classification," Revision 13, outlined the components that should have preventive maintenance scheduled. The preventive maintenance for cleaning the lube oil reservoir should have been classified as essential in accordance with Procedure EN-DC-153, but the maintenance had not been performed since 2006. Maintenance personnel changed the maintenance that included reservoir cleaning in 2007 to inactive status without documenting a technical basis, and in 2009 the licensee reclassified the maintenance as non-critical, contrary to Procedure EN-DC-153. As a result, the licensee no longer scheduled main feedwater pump turbine bearing oil reservoir cleanings. During the 2015 Unit 2 refueling outage, the licensee worked on a pump submerged in this reservoir, which stirred the accumulated debris into the circulation path and may have contributed to clogging the filters.

The licensee also identified that operators had failed to swap filters in accordance with Vendor Manual TDG 080 3250, "Installation, Operation and Maintenance for the General Electric Steam Turbine Feed Pump Drive," Revision 8, resulting in the failed O-ring.

Analysis. The failure to perform preventive maintenance to ensure cleanliness on the main feedwater pump turbine bearing oil reservoir as required by the preventive maintenance program is a performance deficiency. The performance deficiency is more than minor because it impacted the equipment performance attribute and adversely affected the initiating events cornerstone objective to limit the likelihood of events that upset plant stability and challenged critical safety functions during shutdown as well as power operations. Specifically, the performance deficiency resulted in operators lowering reactor power and rendered a main feedwater pump unavailable. Using NRC Inspection Manual Chapter 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, the inspectors screened the finding as having very low safety significance because the finding affected a transient initiator but did not result in a reactor trip. The inspectors determined that this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance. Specifically, the maintenance strategy was changed in 2009.

Enforcement. This finding did not involve enforcement because no regulatory requirements were violated. Although the licensee failed to follow Procedure EN-DC-153, "Preventive Maintenance Component Classification," Revision 13, the inspectors determined that this was a self-imposed standard and did not constitute a regulatory requirement. The licensee entered this finding into their corrective action program as Condition Report CR-ANO-2-2016-00470. The licensee implemented the necessary preventive maintenance. FIN 05000368/2016002-02, "Failure to Clean Main Feedwater Lube Oil Reservoir Leads to Reactor Power Reduction."

40A3 Follow-up of Events and Notices of Enforcement Discretion (71153)

(Closed) LER 05000368/2015-001-00, Purge Radiation Monitor Discovered Inoperable During Fuel Movement

On October 26, 2015, an operator discovered the Unit 2 Containment Purge and Exhaust Isolation Process Monitor sample pump off. The sample pump had been off for

approximately five hours, which made the monitor inoperable during fuel movement. The enforcement aspects of this violation are discussed in Section 4OA7 of this report.

This licensee event report is closed.

These activities constitute completion of one event follow-up sample, as defined in Inspection Procedure 71153.

4OA5 Other Activities

Quarterly Performance Assessment

In the NRC's 2014 annual assessment letter (ML15063A499), dated March 4, 2015, the NRC documented that the performance of Arkansas Nuclear One, Units 1 and 2, was within the Multiple/Repetitive Degraded Cornerstone Column (Column 4) of the NRC's Reactor Oversight Process Action Matrix.

In accordance with NRC Inspection Manual Chapter 0305, "Operating Reactor Assessment Program," Issued December 23, 2015, a quarterly review of performance is required for a plant whose performance is in Column 4 of the Action Matrix.

On June 30, 2016, NRC management reviewed inspection and performance indicator results for Units 1 and 2. The NRC determined that continued plant operation was acceptable in the Multiple/Repetitive Degraded Cornerstone of the Reactor Oversight Process Action Matrix. In addition, no additional regulatory actions beyond those described in the annual assessment letter were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On July 5, 2016, the inspectors presented the inspection results to Mr. J. Browning, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as non-cited violation.

- Unit 2 Technical Specification Limiting Condition for Operation 3.3.3.1, Radiation Monitoring Instrumentation, requires that the radiation monitoring instrumentation channels shown in Table 3.3-6, Radiation Monitoring Instrumentation, shall be operable with their alarm/trip set points within the specified limits. Table 3.3-6, Item 2.a requires that the containment purge and exhaust radiation monitoring instrumentation be capable of isolating containment when process radiation equals or exceeds two times the background radiation rate. Contrary to the above, on October 26, 2015, the licensee failed to ensure that the required containment purge and exhaust radiation monitor remained operable to isolate

containment when process radiation equals or exceeds two times the background radiation rate. Specifically, the licensee failed to restart the containment purge and exhaust isolation radiation monitor sample pump, which supplies process sample flow to the radiation monitor, following an electrical bus transfer which removed power to the sample pump. As a result, the containment ventilation system would not have automatically isolated to prevent a release of radioactive material in the event of a fuel handling accident. However, operators could manually isolate the ventilation system if a fuel accident occurred. An operator restarted the process sample pump and documented the issue in Condition Report CR-ANO-2-2015-04197.

Because the finding degraded the ability to close or isolate the containment, NRC Inspection Manual Chapter 0609 Appendix G, "Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings," dated May 9, 2014, directed the inspectors to use NRC Inspection Manual Chapter 0609 Appendix H, "Containment Integrity Significance Determination Process," dated May 6, 2004. The inspectors classified the finding as a degraded condition that has potentially important implications for the integrity of the containment, without affecting the likelihood of core damage (Type B). Using the Phase 1 screening for Type B findings, the inspectors determined the finding to be of very low safety significance or Green, because the deficiency did not occur within eight days of the start of the refueling outage.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

D. Barborek, Engineer
R. Barnes, Director, Regulatory Affair & Performance Improvement
L. Blocker, Nuclear Oversight Manager
J. Browning, Site Vice President
P. Butler, Design and Program Engineering Manager
B. Daiber, Recovery Manager
B. Davis, Engineering Director
T. Evans, General Manager of Plant Operations
D. James, Director, Regulatory Affairs & Recovery
D. Marvel, Radiation Protection Manager
N. Mosher, Licensing Specialist
D. Pehrson, Unit 1 Assistant Operations Manager
S. Pyle, Regulatory Assurance Manager
B. Short, Senior Licensing Specialist
J. Toben, Senior Manager, Project Management Regulatory and Performance Improvement

NRC Personnel

R. Deese, Senior Reactor Analyst

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000368/2016002-01	FIN	Failure to Incorporate Vendor Guidance in Work Order (Section 1R12)
05000368/2016002-02	FIN	Failure to Clean Main Feedwater Lube Oil Reservoir Leads to Reactor Power Reduction (Section 4OA2.2)

Closed

05000368/2015-001-00	LER	Purge Radiation Monitor Discovered Inoperable During Fuel Movement (Section 4OA3)
----------------------	-----	---

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-2104.036	Emergency Diesel Generator Operation	090
OP-2106.006	Emergency Feedwater System Operations	091
OP-2104.037	Alternate AC Diesel Generator Operations	031

Condition Reports (CRs)

CR-ANO-C-2015-04883

Section 1R05: Fire Protection

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-2307.040	Unit 2 Incipient Fire Instrumentation Operability	006
PFP-U1-R018	Unit 1 Pre-Fire Plans	018
PFP-U2-R014	Unit 2 Pre-Fire Plans	014
PRP-UC-R014	Common Unit Pre-Fire Plans	014

Condition Reports (CRs)

CR-ANO-2-2016-01035 CR-ANO-2-2016-01075 CR-ANO-2-2016-01100
CR-ANO-1-2016-01966 CR-ANO-1-2016-01965

Section 1R06: Flood Protection Measures

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
M-2217	Emergency Diesel Generator Fuel Oil System	064
M-217	Emergency Diesel Generators Fuel Oil Storage	089

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EC-61840	Internal Flood Protection Design Basis	001
CALC-ANOC-CS-15-00003	ANO Flood Protection Design Basis	001

Condition Reports (CRs)

CR-ANO-2-2016-01889

Section 1R11: Licensed Operator Requalification Program and Licensed Operator Performance

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-2102.004	Power Operation	061
OP-1104.036	Emergency Diesel Generator Operation	071

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
SES-1-030	Unit 1 Dynamic Exam Scenario	000
A2SPGLOR160501	Loss of Turbine Load	000

Section 1R12: Maintenance Effectiveness

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-WM-105	Planning	016

Condition Reports (CRs)

CR-ANO-2-2015-04821 CR-ANO-2-2015-04832 CR-ANO-2-2015-04859

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-2102.004	Power Operation	061
COPD-024	Risk Assessment Guidelines	060

Condition Reports (CRs)

CR-ANO-2-2016-01993 CR-ANO-2-2016-02211 CR-ANO-2-2016-02342

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EC-43780	Temp Fire Water from Domestic Water 2H-7 to 2H-10 via B5B Temp Fire Pump	001

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1203.046	Loss of Loadcenter	012

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
TD I005.0130	Installation/Maintenance Instructions for I-T-E Low Voltage Power Circuit Breakers Type K-225 thru 2000 & K600S thru 2000S	0, 1, 2, 3, 4
5010.-015-ATT-5	Qualification of Piping and Support Mods for PC 980066P201-01	001

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u>
E-357	Schematic Diagram Aux. Bldg. Radwaste Exhaust Fan	016
6600-M2035-4(1)-9	Vertical Strainer – Model WN-1	009
6600-M2035-15-3	20" O.D. Basket Strainer	003

Condition Reports (CRs)

CR-ANO-C-2016-01042	CR-ANO-1-2016-00847	CR-ANO-1-2016-00815
CR-ANO-1-2016-01133	CR-ANO-2-2011-00482	CR-ANO-2-2011-00483
CR-ANO-2-2011-00952	CR-ANO-2-2015-04721	CR-ANO-2-2015-04729
CR-ANO-1-2016-00582	CR-ANO-2-2016-00261	CR-ANO-2-2016-00938
CR-ANO-2-2016-00671		

Work Orders

266694	266985	390422
52611231	52611232	

Section 1R19: Post-Maintenance Testing

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1104.032	Fire Protection Systems	084
OP-2104.036	Emergency Diesel Generator Operations	090

Work Orders

273894	277492	418804
422059	52634531	

Section 1R22: Surveillance Testing

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1000.009A	Surveillance Test Program Revision Sheet	027
OP-2104.037	Alternate AC Diesel Generator Operations	031
OP-1103.013	RCS Leak Detection	042
EN-CY-116	Reactor Coolant System Chemistry Control	
OP-2305.002	Reactor Coolant System Leak Detection	025

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
ULD-0-SYS-19	ANO-1 Alternate AC Generator System	001
STM 2-33	ANO Unit 2 System Training Manual Alternate AC Diesel Generator	025

Condition Reports (CRs)

CR-ANO-2-2016-01634	CR-ANO-2-2016-01643	CR-ANO-2-2016-01644
CR-ANO-2-2016-01646	CR-ANO-C-2016-01852	CR-ANO-C-2016-01865

Work Orders

52598305	52625903	52591788
52582007	52593621	

Section 4OA1: Performance Indicator Verification

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-CY-116	Reactor Coolant System Chemistry Control	000
EN-LI-114	Regulatory Performance Indicator Process	007

Section 4OA2: Problem Identification and Resolution

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-2203.012J	Annunciator 2K10 Corrective Action	042
OP-2203.016	Excess RCS Leakage	017
OP-2305.002	Reactor Coolant System Leak Detection	025
OP-2106.007	Main Feedwater Pump and FWCS Operation	055
EN-DC-153	Preventive Maintenance Component Classification	013
TDG 080 3250	Installation, Operation, and Maintenance for the General Electric Steam Turbine Feed Pump Drive	008

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision</u> <u>Date</u>
576483	Reactor Drain Tank Dimension Outline	December 6, 1971

Condition Reports (CRs)

CR-ANO-2-2015-04744	CR-ANO-2-2015-04745	CR-ANO-2-2016-00587
CR-ANO-2-2013-00375	CR-ANO-2-2016-00470	

4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153)

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-2104.033	Containment Atmosphere Control	076
OP-2104.035	Ventilation System Operations	040
OP-2107.007	ESF Electrical Bus Outage	018

Drawings

<u>Number</u>	<u>Title</u>	<u>Revision Date</u>
C2260, No. 112	Equipment Foundation for Containment Purge Exhaust Fan	July 23, 1979

Miscellaneous

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2CAN121503	Purge Radiation Monitor Discovered Inoperable During Fuel Movement	
2CAN080002	Proposed Technical Specification Changes – Specification 3.9.4	
STM 2-09	Containment Cooling and Purge Systems	016

Condition Reports (CRs)

CR-ANO-2-2008-00763	CR-ANO-2-2015-04197
---------------------	---------------------