



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION IV
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ARLINGTON, TX 76011-4511

February 1, 2018

Mr. Richard L. Anderson
Site Vice President
Entergy Operations, Inc.
Arkansas Nuclear One
1448 S.R. 333
Russellville, AR 72802

**SUBJECT: ARKANSAS NUCLEAR ONE – NRC INTEGRATED INSPECTION REPORT
05000313/2017004 AND 05000368/2017004**

Dear Mr. Anderson:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Arkansas Nuclear One facility, Units 1 and 2. On January 8, 2018, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. One of the findings involved a violation of NRC requirements. Additionally, NRC inspectors documented a licensee-identified violation, which was determined to be of very low safety significance (Green) in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the 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; and the NRC resident inspector at Arkansas Nuclear One.

If you disagree with a cross-cutting aspect assignment 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.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

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

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

Enclosure:

Inspection Report 05000313/2017004 and
05000368/2017004

w/ Attachment:

1. Supplemental Information
2. Occupational Radiation Safety Inspection
Request for Information

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket: 05000313; 05000368

License: DPR-51; NPF-6

Report: 05000313/2017004; 05000368/2017004

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: October 1 through December 31, 2017

Inspectors: C. Henderson, Senior Resident Inspector
L. Carson, II, Senior Health Physicist
S. Graves, Senior Reactor Inspector
N. Greene, PhD, Health Physicist
C. Osterholtz, Senior Operations Engineer
G. Pick, Senior Reactor Inspector
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Approved By: Neil O'Keefe
Chief, Project Branch E
Division of Reactor Projects

Enclosure

SUMMARY

IR 05000313/2017004; 05000368/2017004; 10/01/2017 – 12/31/2017; Arkansas Nuclear One, Units 1 and 2; Integrated Inspection Report; Plant Modifications; Problem Identification and Resolution.

The inspection activities described in this report were performed between October 1 and December 31, 2017, by the resident inspectors at Arkansas Nuclear One and inspectors from the NRC's Region IV office. Two findings of very low safety significance (Green) were documented in this report. All these findings involved violations of NRC requirements. Additionally, NRC inspectors documented a licensee-identified violation of very low safety significance (Green). The significance of inspection findings is indicated by their color (i.e., Green, greater than Green, White, Yellow, or Red), determined using Inspection Manual Chapter 0609, "Significance Determination Process," dated April 29, 2015. Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. 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," dated July 2016.

Cornerstone: Mitigating Systems

- Green. The inspectors identified a finding for the licensee's failure to implement work management procedure requirements while planning compensatory measures needed to minimize plant risk during firewater system maintenance associated with fire protection valve FS-13. In order to isolate the work area to replace this valve, the flow path from the installed fire pumps to the main fire header would be blocked. However, the licensee failed to ensure that review and approval of the planned compensatory measure to provide an alternate flow path for fire water to the main fire header was obtained from all required groups prior to implementing the work. As a result, the installed hose was too small to ensure the fire water system flow requirements could be met. The licensee's immediate corrective action was to assess functionality of the fire water system with the compensatory measure installed to determine if the system was still functional. The licensee determined the fire water system was nonfunctional for this condition, removed the compensatory measure, and restored the system to its normal configuration. The licensee entered this deficiency into the corrective action program as Condition Report CR-ANO-C-2017-04125.

The licensee's failure to properly plan fire water system maintenance to ensure adequate system capacity was available was a performance deficiency. The performance deficiency is more than minor because it is associated with the protection against external factors attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee's failure to properly plan fire water system work led to degraded fire suppression capability. Using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013, the inspectors determined that the finding had very low safety significance (Green) because at least 50 percent of the required fire water capacity (flow at required pressure) remained available. The finding had a cross-cutting aspect in the area of human performance associated with work management because the licensee failed to

implement a process of planning, controlling, and executing work activities that included coordination among different groups such that nuclear safety is the overriding priority. Specifically, the licensee failed to coordinate among planning, maintenance, operations, and engineering to ensure that appropriate technical reviews were performed to validate that the planned compensatory measure for the fire water system met the minimum system flow requirements [H.5]. (Section 1R18)

- Green. The inspectors identified a finding and associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to promptly identify and correct weakened closing springs, a condition adverse to quality, associated with safety-related 4160 volt Siemens vacuum breakers in both units. This condition was identified in a vendor report received by the licensee in December 2016, but not correctly recognized and corrected until after subsequent breaker failures on May 30 and July 29, 2017. Once the condition was correctly categorized, the initiated corrective action was to assess operability of the safety-related 4160 volt Siemens vacuum breakers installed in Unit 1 and Unit 2, and replace the closing springs with stronger springs. The licensee entered this deficiency into the corrective action program as Condition Report CR-ANO-C-2018-00298.

The licensee's failure to promptly identify and correct a condition adverse to quality associated with the safety-related 4160 volt Siemens vacuum breaker closing springs was a performance deficiency. The performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and adversely affected the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, the inspectors determined that the finding had very low safety significance (Green) because it: was not a design deficiency; did not represent a loss of system and/or function; did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time; and did not result in the loss of a high safety-significant, nontechnical specification train. The finding had a cross-cutting aspect in the area of human performance associated with consistent process because the licensee failed to use a consistent, systematic approach, with risk insights incorporated as appropriate, to make decisions. Specifically, the licensee did not use the corrective action program and troubleshooting guidance consistently, systematically, and with consideration of appropriate risk insights to promptly identify and correct a condition adverse to quality associated with weakened breaker closing springs [H.13]. (Section 4OA2)

Licensee-Identified Violations

A violation of very low safety significance (Green) 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

Arkansas Nuclear One, Unit 1 and Unit 2, began the inspection period at full power, where they remained for the rest of the reporting period, except for minor reductions in power to support scheduled surveillances.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

On December 15, 2017, the inspectors completed an inspection of the station's readiness for seasonal extreme weather conditions. The inspectors reviewed the licensee's adverse weather procedures for seasonal low temperatures and evaluated the licensee's implementation of these procedures. The inspectors verified that prior to the onset of cold weather; the licensee had corrected weather-related equipment deficiencies identified during the previous cold weather season.

The inspectors selected two risk-significant systems that were required to be protected from cold weather conditions:

- Unit 1 emergency diesel generator rooms
- Unit 1 service water intake structure

The inspectors reviewed the licensee's procedures and design information to ensure the systems would remain functional when challenged by seasonal extreme cold weather conditions. The inspectors verified that operator actions described in the licensee's procedures were adequate to maintain readiness of these systems. The inspectors walked down portions of these systems to verify the physical condition of the adverse weather protection features.

These activities constituted one sample of readiness for seasonal adverse weather, as defined in Inspection Procedure 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

Partial Walk-Down

a. Inspection Scope

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

- October 12, 2017, Unit 1 and Unit 2 fire water system
- November 15, 2017, Unit 1 emergency diesel generator 1 ventilation system
- November 17, 2017, Unit 1 service water intake structure ventilation system
- November 21, 2017, Unit 1 emergency feedwater turbine driven pump

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 four partial system walk-down samples, as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

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:

- October 10, 2017, Unit 1 auxiliary building east (train B) decay heat removal pump room, Fire Zone 10-EE, Fire Area A
- October 14, 2017, Unit 1 auxiliary building emergency feedwater pump room, Fire Zone 38-Y, Fire Area C
- December 15, 2017, Unit 1 main steam isolation valve room, Fire Zone 170-Z, Fire Area B-1
- December 15, 2017, Unit 2 main steam isolation valve room, Fire Zone 2158-F, Fire Area B-5

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 October 24, 2017, 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 one plant area containing risk-significant structures, systems, and components (SSCs) that were susceptible to flooding:

- Unit 1 auxiliary building elevation 335 feet emergency feedwater pump room

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.

In addition, on December 15, 2017, the inspectors completed an inspection of underground bunkers susceptible to flooding. The inspectors selected two underground bunkers that contained risk-significant or multiple-train cables whose failure could disable risk-significant equipment:

- Manhole MH-7
- Manhole MH-8

The inspectors observed the material condition of the cables and splices contained in the bunkers and looked for evidence of cable degradation due to water intrusion. The inspectors verified that the cables and vaults met design requirements.

These activities constituted completion of one flood protection measures sample and one bunker/manhole sample, as defined in Inspection Procedure 71111.06.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07)

Triennial Heat Sink Inspection

a. Inspection Scope

Between November 13 and 17, 2017, the inspectors reviewed licensee programs to verify heat exchanger performance and operability for the following heat exchangers:

- Unit 1 train A reactor building service water cooler coil
- Unit 1 train B loop decay heat cooler
- Unit 2 train A component cooling water heat exchanger
- Unit 1 and Unit 2 emergency cooling pond

The inspectors verified whether testing, inspection, maintenance, and chemistry control programs are adequate to ensure proper heat transfer. The inspectors verified that the periodic testing and monitoring methods, as outlined in commitments to NRC Generic Letter 89-13, utilized proper industry heat exchanger guidance. Additionally, the inspectors verified that the licensee's chemistry program ensured that biological fouling was properly controlled between tests. The inspectors reviewed previous maintenance records of the heat exchangers to verify that the licensee's heat exchanger inspections adequately addressed structural integrity and cleanliness of their tubes. Specific documents reviewed during this inspection are listed in the attachment.

These activities constituted completion of four triennial heat sink inspection samples, as defined in Inspection Procedure 71111.07-05.

b. Findings

No findings were identified.

c. Unresolved Items

Technical Specifications for Maximum Temperature of Service Water System When Aligned to Lake Dardanelle

Introduction. The inspectors identified an unresolved item related to the maximum temperature limits of the Unit 1 service water system. Specifically, the service water system assumes a maximum lake temperature of 95 degrees Fahrenheit in the Safety Analysis Report (SAR) as well as the design basis analyses of record. However, the inspectors noted that there is no technical specification limitation to operating Unit 1 with service water supply temperatures at or above 95 degrees Fahrenheit.

Description. The ultimate heat sink for Unit 1 is comprised of the Lake Dardanelle Reservoir and the safety-related emergency cooling pond (ECP). The preferred water source is Lake Dardanelle, and the emergency cooling pond is credited for mitigating an accident caused by the loss of the lake. The SAR, Section 6.3.2 states, in part, that, "The 95 F service water (cooling water inlet temperature) is based upon the maximum expected temperature of the Lake Dardanelle Reservoir." Further, the safety analysis for emergency core cooling systems assumes that the initial lake temperature at the start of an accident does not exceed 95 degrees Fahrenheit.

The Technical Specification Surveillance Requirement 3.7.8.2, "Emergency Cooling Pond," requires that the average water temperature of the emergency cooling pond be less than or equal to 100 degrees Fahrenheit to be operable. The basis for Section 3.7.8.2 states, in part:

The operating limits are based on conservative heat transfer analyses for the worst case initial conditions that could be present considering a Unit 2 Design Basis Accident concurrent with a normal shutdown of Unit 1 and a loss of the

Dardanelle Reservoir water inventory. To be considered OPERABLE, the ECP must contain a sufficient volume of water at or below the maximum temperature that would allow the service water system (SWS) to operate for at least 30 days following the design basis event without exceeding the maximum design temperature of the equipment served by the SWS. To meet this condition, the ECP initial temperature should not exceed 100 degrees Fahrenheit, and the volume of water should not fall below 70 acre-feet during normal unit operation.

However, the technical specifications, Section 3.7.7, "Service Water System," does not require any temperature limitations, despite the fact that the initial conditions assume a maximum design temperature of 95 degrees Fahrenheit in the design basis accident safety analyses and described in the SAR. The technical specification bases, Section 3.7.7, states, in part, that, "The principal safety related function of the service water system (SWS) is the transfer of heat from the reactor and safety related components to the heat sink."

In response to this issue, the licensee provided an analysis that demonstrated that the containment equipment used to mitigate a design basis accident would remain environmentally qualified with service water system temperatures up to 100 degrees Fahrenheit. This issue will be tracked as an unresolved item pending additional inspection. (URI 05000313/2017004-01, "Technical Specifications for Maximum Temperature of Service Water System When Aligned to Lake Dardanelle")

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

.1 Review of Licensed Operator Requalification

a. Inspection Scope

On October 25, 2017, the inspectors observed an evaluated simulator scenario performed for Unit 1 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 Unit 1 simulator during the requalification activities.

On October 25, 2017, the inspectors observed an evaluated simulator scenario performed for Unit 2 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 Unit 2 simulator during the requalification activities.

These activities constituted 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 plants main control room. At the time of the observations, the plant was in a period of heightened activity and risk. The inspectors observed the operators' performance of the following activities:

- October 27, 2017, Unit 1 and Unit 2 automatic transformer lockout during testing resulting in the loss of Unit 1 startup transformer 1 and Unit 2 startup transformer 3
- November 3, 2017, Unit 1 power reduction to 83 percent and main turbine throttle valve testing

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

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

b. Findings

No findings were identified.

.3 Annual Review of Requalification Examination Results

The licensed operator requalification program involves two training cycles that are conducted over a 2-year period. In the first cycle, the annual cycle, the operators are administered an operating test consisting of job performance measures and simulator scenarios. In the second part of the training cycle, the biennial cycle, operators are administered an operating test and a comprehensive written examination. For this annual inspection requirement, Arkansas Nuclear One, Unit 2, was in the first part of the training cycle while Arkansas Nuclear One, Unit 1, was in the second part of the training cycle.

a. Inspection Scope

The inspector conducted an in-office review of the annual requalification training program to determine the results of this program.

On November 17, 2017, the licensee informed the inspector of the following Unit 1 results:

- 10 of 10 crews passed the simulator portion of the operating test
- 55 of 56 licensed operators passed the simulator portion of the operating test
- 55 of 56 licensed operators passed the job performance measure portion of the operating test

- 51 of 56 licensed operators passed the written examination

Four individuals failed the written examination and were remediated, retested, and passed their retake written examination prior to returning to shift.

One licensed operator was not examined due to being on temporary assignment to the Institute of Nuclear Power Operations (INPO).

On November 17, 2017, the licensee informed the inspector of the following Unit 2 results:

- 8 of 8 crews passed the simulator portion of the operating test
- 61 of 61 licensed operators passed the simulator portion of the operating test
- 61 of 61 licensed operators passed the job performance measure portion of the operating test

These activities constituted completion of two inspection samples of the annual licensed operator requalification program, as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

Routine Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed two instances of degraded performance or conditions of safety-significant structures, systems, and components (SSCs):

- October 19, 2017, Unit 1 and Unit 2 4160 volt safety-related Siemens vacuum breaker failure to close
- November 16, 2017, Unit 1 emergency feedwater initiation and control system power supply failures

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 two maintenance effectiveness samples, as defined in Inspection Procedure 71111.12.

b. Findings

No findings were identified.

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

a. Inspection Scope

On December 31, 2017, the inspectors reviewed a risk assessment performed by the licensee prior to changes in plant configuration and the risk management actions taken by the licensee in response to elevated risk associated with Unit 1 service water pump A planned maintenance and 161 kV switchyard activities.

The inspectors verified that this risk assessment was 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 assessment and verified that the licensee implemented appropriate risk management actions based on the results of the assessment.

The inspectors also observed portions of five emergent work activities that had the potential to cause an initiating event, to affect the functional capability of mitigating systems, or to impact barrier integrity:

- October 5, 2017, Unit 2 service water pump C motor replacement after motor/pump coupling damage following bump testing
- October 11, 2017, Unit 2 decay heat removal pump B isolation recirculation valve, DH-1409, weld crack and unplanned entry into Technical Specification 3.5.2
- October 12, 2017, Unit 1 and Unit 2 mis-positioned fire water valve identified during maintenance activities
- October 27, 2017, Unit 1 emergency air filtering fan failure
- December 1, 2017, auto transformer lockout and loss of Unit 1 startup transformer 1 and Unit 2 startup transformer 3

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 constituted completion of six 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:

- October 3, 2017, operability determination of Unit 2 service water pump A replacement being rescheduled to the Unit 2 Refueling Outage 26
- October 16, 2017, operability determination of Unit 2 service water pump C following motor/pump coupling damage
- October 25, 2017, operability determination for missed surveillance of Unit 1 and Unit 2 emergency cooling pond 12 month capacity determination
- October 26, 2017, operability determination of Unit 2 engineering safety feature equipment room Door 206 radiological barrier degraded/nonconforming condition
- October 26, 2017, operability determination of Unit 2 engineering safety feature equipment room Door 203 failed open during maintenance activities
- November 29, 2017, operability determination of Unit 1 emergency feedwater turbine driven governor not consistently maintaining speed

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 constituted completion of six operability review samples, as defined in Inspection Procedure 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

Temporary Modifications

a. Inspection Scope

The inspectors reviewed two temporary plant modifications that affected risk-significant SSCs:

- November 13, 2017, Unit 1 bypass of nuclear instrument 8 input in emergency feedwater initiation and control and reactor protection system channel D

- December 31, 2017, Unit 1 and Unit 2 provide temporary fire water supply alignment to support fire protection valve FS-13 replacement

The inspectors verified that the licensee had installed and removed these temporary modifications in accordance with technically adequate design documents. The inspectors verified that these modifications did not adversely impact the operability or availability of affected SSCs. The inspectors reviewed design documentation and plant procedures affected by the modifications to verify the licensee maintained configuration control.

These activities constituted completion of two samples of temporary modifications, as defined in Inspection Procedure 71111.18.

b. Findings.

Introduction. The inspectors identified a Green finding for the licensee's failure to implement work management procedure requirements while planning compensatory measures needed to minimize plant risk during firewater system maintenance associated with fire protection valve FS-13. Specifically, the licensee failed to ensure that review and approval of the planned compensatory measure to provide an alternate flow path for fire water to the main fire header was obtained from all required groups prior to implementing the work. As a result, the installed hose was too small to ensure the fire water system flow requirements could be met.

Description. On October 24, 2017, the inspectors performed a fire water system walk down of the compensatory measure installed for the replacement of fire protection valve FS-13 under Work Order (WO) 472502. Because performing the intended work necessitated isolating the flow path from both installed fire pumps to the fire header that supplied fire water to both units, the work order installed a temporary hose to allow fire water to be supplied from the test header on the motor-driven firewater pump to fire hydrant H-1 on the main fire water header. The WO 472502 instructions directed licensee personnel to install a 6-inch diameter hose between these points. From the inspector's walk down of the compensatory measure, it was identified the licensee actually installed a 5-inch diameter hose. As a result, the temporary configuration would not provide the required system flow.

Upon further review, it was also identified that the hose size was based on an invalid technical evaluation documented in Engineering Evaluation ER-ANO-2002-00780-003. This engineering evaluation was completed prior to the site transitioning to a risk-informed fire protection program, when a higher minimum system flow rate was established. The compensatory measure established by WO 472502 was not reviewed by engineering personnel to ensure the new fire water system flow requirements were met during the planning of the FS-13 maintenance, even though the appropriate engineering personnel were required to review the work order prior to implementation. When the appropriate engineering personnel later reviewed the issue, they identified that the work order was based on the wrong minimum system flow requirement. As a result, even if the 6-inch hose had been installed as specified in the work order instructions, the temporary system modification still would not have been adequate to supply the required system flow. Additionally, the inspectors identified that the licensee did not perform a post-modification test to validate that the compensatory measure was installed correctly and system flow was sufficient to ensure adequate fire suppression capability. The

licensee entered this deficiency into the corrective action program as Condition Report CR-ANO-C-2017-04125.

The licensee's immediate corrective action was to assess the functionality of the fire water system with the existing configuration installed to determine if the system remained functional. When the licensee determined the fire water system was nonfunctional for this condition, they removed the compensatory measure and restored the system to its normal configuration. This action restored functionality of the fire water system.

The licensee performed an apparent cause analysis (ACA), documented in Condition Report CR-ANO-C-2017-04125, to determine the direct and contributing causes associated with the failure to properly plan WO 472502 to ensure an adequate compensatory measure was established for the maintenance associated with valve FS-13. The direct cause was that the licensee did not ensure the compensatory measure for the risk significant replacement of valve FS-13 was evaluated, documented, and planned to minimize the fire equipment out of service time and mitigate increased station fire risk. The contributing factor was that the licensee did not ensure planned activities were reviewed by all effected organizations evaluated for risk management activities per Attachment 9.3 of procedure EN-WM-104, "On Line Risk Assessment," Revision 16. Specifically, a contracted planner had which inappropriately used Engineering Evaluation ER-ANO-2002-00780-003 to establish the compensatory measure for the fire water system during the replacement of valve FS-13, and had failed to coordinate with engineering and operations for their reviews of WO 472502,. The licensee's ACA concluded that considering the scope of work defined in WO 472502 and the increased risk created by the planned compensatory measure, procedure EN-WM-104 required the work order to include the review and approval from the fire protection engineer, the fire protection system engineer, the shift manager associated with the fire impairment team, and a supervisor in the Maintenance Department prior to implementing WO 472502. The licensee determined that they failed to obtain the review and approval from the fire protection engineer, the fire protection system engineer, and the shift manager associated with the fire impairment team prior to implementing WO 472502.

While examining why a smaller hose was installed, the licensee identified that the flanged 6 inch hose called for in the work order was not available on site, but workers identified a 5 inch hose with 6 inch flanges in the warehouse. Contract personnel contacted licensee supervision for further guidance. Licensee oversight incorrectly assumed the 6 inch hose description actually referred to a hose with 6 inch flange connections without reviewing work order instructions, and gave verbal approval to use the 5 inch hose.

Analysis. The licensee's failure to properly plan fire water system maintenance to ensure adequate system capacity was available was a performance deficiency. The performance deficiency is more than minor because it is associated with the protection against external factors attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee's failure to properly plan fire water system work degraded the fire suppression capability. Using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," dated September 20, 2013, the inspectors determined that the finding had very low safety significance (Green) because

at least 50 percent of the required fire water capacity (flow at required pressure) remained available. The finding had a cross-cutting aspect in the area of human performance associated with work management because the licensee failed to implement a process of planning, controlling, and executing work activities that included coordination among different groups such that nuclear safety is the overriding priority. Specifically, the licensee failed to coordinate among planning, maintenance, operations, and engineering to ensure that appropriate technical reviews were performed to validate that the planned compensatory measure for the fire water system met the minimum system flow requirements [H.5].

Enforcement. The inspectors concluded that this issue did not involve a violation of regulatory requirements. Therefore, this performance deficiency is being treated as a finding of very low safety significance (Green) and was entered into the licensee's corrective action program as Condition Report CR-ANO-C-2017-04125. (FIN 05000313/2017004-02; FIN 05000368/2017004-02, "Failure to Properly Plan Fire Water System Maintenance")

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

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

- October 16, 2017, Unit 2 service water pump C motor replacement following motor/pump coupling damage
- October 20, 2017, Unit 1 low pressure injection pump B isolation recirculation line isolation valve, DH-1409, replacement
- November 6, 2017, Unit 1 emergency feedwater initiation and control system channel D power supply PS-1 replacement
- November 16, 2017, Unit 1 emergency feedwater motor driven pump 4160 volt Siemens vacuum breaker replacement
- November 22, 2017, Unit 1 restoration of nuclear instrument 8 to reactor protection system channel D

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 constituted completion of five 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 two 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:

Other surveillance tests:

- October 16, 2017, Unit 2 service water pump C in service testing surveillance
- November 29, 2017, Unit 1 emergency feedwater initiation and control channel D monthly surveillance testing

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 tests satisfied appropriate acceptance criteria. The inspectors verified that the licensee restored the operability of the affected SSCs following testing.

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

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstones: Public Radiation Safety and Occupational Radiation Safety

2RS2 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope

The inspectors assessed licensee performance with respect to maintaining individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors performed this portion of the attachment as a post-outage review. During the inspection the inspectors interviewed licensee personnel, reviewed licensee documents, and evaluated licensee performance in the following areas:

- Radiological work planning, including work activities of exposure significance, and radiological work planning ALARA evaluations, initial and revised exposure estimates, and exposure mitigation requirements. The inspectors also verified that the licensee's planning identified appropriate dose reduction techniques, reviewed any inconsistencies between intended and actual work activity doses, and determined if post-job (work activity) reviews were conducted to identify lessons learned.
- Verification of dose estimates and exposure tracking systems, including the basis for exposure estimates, and measures to track, trend, and if necessary reduce occupational doses for ongoing work activities. The inspectors evaluated the

licensee's method for adjusting exposure estimates and reviewed the licensee's evaluations of inconsistent or incongruent results from the licensee's intended radiological outcomes.

- Problem identification and resolution for ALARA planning. The inspectors reviewed audits, self-assessments, and corrective action program documents to verify problems were being identified and properly addressed for resolution.

These activities constituted completion of three of the five required samples of the occupational ALARA planning and controls program, as defined in Inspection Procedure 71124.02, and completes the inspection.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

a. Inspection Scope

The inspectors evaluated the accuracy and operability of the licensee's personnel monitoring equipment, verified the accuracy and effectiveness of the licensee's methods for determining total effective dose equivalent, and verified that the licensee was appropriately monitoring occupational dose. The inspectors interviewed licensee personnel, walked down various portions of the plant, and reviewed licensee performance in the following areas:

- Source term characterization, including characterization of radiation types and energies, hard-to-detect isotopes, and scaling factors.
- External dosimetry including National Voluntary Laboratory Accreditation Program (NVLAP) accreditation, storage, issue, use, and processing of active and passive dosimeters.
- Internal dosimetry, including the licensee's use of whole body counting, use of in vitro bioassay methods, dose assessments based on airborne monitoring, and the adequacy of internal dose assessments.
- Special dosimetric situations, including declared pregnant workers, dosimeter placement and assessment of effective dose equivalent for external exposures (EDEX), shallow dose equivalent, and neutron dose assessment.
- Problem identification and resolution for occupational dose assessment. The inspectors reviewed audits, self-assessments, and corrective action program documents to verify problems were being identified and properly addressed for resolution.

These activities constituted completion of the five required samples of the occupational dose assessment program, as defined in Inspection Procedure 71124.04.

b. 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

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index: Residual Heat Removal Systems (MS09)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of October 1, 2016, through September 30, 2017, to verify the accuracy and completeness of the reported data. 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 mitigating system performance index for residual heat removal systems for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index: Cooling Water Support Systems (MS10)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of October 1, 2016, through September 30, 2017, to verify the accuracy and completeness of the reported data. 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 mitigating system performance index for cooling water support systems 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 Semiannual Trend Review

a. Inspection Scope

The inspectors reviewed the licensee's corrective action program, performance indicators, system health reports, and other documentation to identify trends that might indicate the existence of a more significant safety issue. The inspectors verified that the licensee was taking corrective actions to address identified adverse trends. The inspectors did not review any cross-cutting themes because none existed at the site.

To verify that the licensee was taking corrective actions to address identified adverse trends that might indicate the existence of a more significant safety issue, the inspectors reviewed the corrective action program documentation associated with the licensee-identified trend in misclassification of condition reports reporting adverse which were coded as being non-adverse. The licensee initiated four condition reports (CRs) containing multiple examples of where CRs were misclassified as non-adverse during a quality assurance corrective action program audit conducted in May 2017.

- CR-ANO-C-2017-02164, initiated on May 23, 2017, identified five CRs identifying inoperable and nonfunctional equipment that should have been classified adverse, but were classified as non-adverse.
- CR-ANO-C-2017-02177, initiated on May 24, 2017, identified seven CRs identifying failures to implement foreign material exclusion (FME) controls in accordance with station procedures that should have been classified as adverse, but were classified as non-adverse.
- CR-ANO-C-2017-02178, initiated on May 24, 2017, identified two CRs identifying failures to implement nonconforming items controlled in accordance with station procedures that should have been classified as adverse, but were classified as non-adverse.

- CR-ANO-C-2017-02163, initiated on May 23, 2017, one CR identifying a malfunction of equipment required for Offsite Dose Calculation Manual monitoring that should have been classified as adverse, but was classified as non-adverse.

These activities constituted completion of one semiannual trend review sample, as defined in Inspection Procedure 71152.

b. Observations and Assessments

The inspectors reviewed the trend identified above and sampled more than 20 CRs that were recently screened by the licensee, and reviewed the licensee corrective actions. The corrective actions were to perform re-occurring training on the classification of CRs for licensee personnel and managers qualified to screen CRs, and to develop metrics to monitor performance associated with classification of CRs. Additionally, the inspectors did not identify any CRs that should have been classified as adverse, but were classified as non-adverse.

For this trend, the inspectors determined that the licensee had identified the trend at a low level, completed an appropriate evaluation, and had taken actions to correct the identified trend.

c. Findings

No findings were identified.

.3 Annual Follow-up of Selected Issues

a. Inspection Scope

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

- From September 1 – November 15, 2017, during an in-office inspection, the inspectors reviewed the four NRC-identified and one licensee-identified issues documented in Inspection Report 05000313/2015405 and 05000368/2015405 for an in-depth follow-up. The inspectors reviewed procedures, digital asset listings, and corrective action documents. The inspectors interviewed personnel involved in implementing the corrective actions.

The inspectors assessed the licensee's cause analyses, extent of condition reviews, and compensatory actions. The inspectors verified that the licensee appropriately prioritized the planned corrective actions and that these actions were appropriate.

- December 1, 2017, Unit 1 and Unit 2 safety-related 4160 volt Siemens vacuum breaker failures due to weakened closing springs

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 planned corrective actions and that these actions were adequate to correct the condition.

- December 4, 2017, Unit 1 emergency feedwater, emergency feedwater initiation and control, integrated plant response during the April 2017 loss of load rejection due to loss of the 500 kV system during severe weather

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 planned corrective actions and that these actions were adequate to correct the condition.

- December 19, 2017, Unit 1 and Unit 2 fire water system valve FS-21 mis-position during surveillance testing

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 planned corrective actions and that these actions were adequate to correct the condition.

These activities constituted completion of four annual follow-up samples, as defined in Inspection Procedure 71152.

b. Findings

Introduction. The inspectors identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to promptly identify and correct weakened closing springs, a condition adverse to quality, associated with Arkansas Nuclear One, Unit 1 (ANO-1) and Unit 2 (ANO-2) safety-related 4160 volt Siemens vacuum breakers. This condition was identified in the vendor report received by the licensee in December 2016, and resulted in a failure of the Unit 2 reactor building spray pump A breaker on May 30, 2017. On July 29, 2017, this condition resulted in the failure of the Unit 1 high pressure injection pump A breaker.

Description. On December 2, 2015, ANO-2 reactor building spray (RBS) pump A failed to start due to the safety-related 4160 volt Siemens vacuum breaker (SA224) tripping open. When the pump did not start, the licensee promptly replace the breaker restoring operability of Train A RBS. The apparent cause of this condition, documented in Condition Report (CR) CR-ANO-2-2015-05124, was the failure of the close pawl roller safety clip installed in the breaker. As part of the corrective actions, the licensee sent two breakers (SA224 and SA212) to the vendor to determine if any underlying issues with their settings and tolerances contributed to the roller failure, and additionally, to determine if those same underlying issues could impact breaker reliability. The vendor identified that the closing springs force for one of the breakers was at the low end of the tolerance band, and below the tolerance band for the other breaker. The vendor replaced the yellow closing springs for each breaker with new red/yellow closing springs verified to be in the upper half of the allowable spring force band. The vendor provided a recommendation describing recommended actions for breakers with low closing spring force in a December 2016 letter. The licensee revised Operating Procedure (OP) 1416.038, "Siemens Vacuum Circuit Breaker Preventive Maintenance," Revision 16, in February 2017, to state the following: "(1) Siemens Failure Analysis Report performed in response to CR-ANO-2-2015-05124 recommends if a breaker exhibits repeated failures to close after verifying proper cell switch plunger travel, the

closing springs may be below the required tolerance for the required force, and may require replacing the yellow coded spring with a red/yellow coded spring; and (2) if the breaker does not close reliably, contact engineering and if required by engineering replace the closing spring and perform a retest of the breaker.” No further actions were taken to investigate the extent of condition associated with the weakened breaker closing springs.

On May 30, 2017, ANO-2 RBS pump A breaker (SA218) failed to close during Refueling Outage (RE) 25. While the pump did not start, it was not required to be operable under the existing plant conditions. This condition was documented in CR-ANO-2-2017-03236, which was closed to Work Order (WO) 477395 and troubleshooting of breaker SA218 commenced on June 5, 2017. The troubleshooting, as documented in WO 477395, determined the need to replace the closing spring in accordance with OP 1416.038, “Siemens Vacuum Circuit Breaker Preventive Maintenance,” Revision 17 due to low closing force. Breaker SA218 was replaced with a spare breaker and no further actions were taken by the licensee associated with the closing spring at that time.

The inspector noted that the licensee classified this breaker problem as a maintenance rule functional failure, initiated CR-ANO-2-2017-03643, and performed an adverse condition analysis (ACA). The licensee concluded that the cause of the breaker failure was the plunger actuator cam being pinned on the shaft in the wrong position; and the causal factor was less than adequate preventive maintenance, noting that Procedure OP 1416.038 did not have a specific requirement to inspect the plunger actuator cam for the correct position on the shaft. The licensee’s corrective actions were: (1) to contact the vendor to determine if there was a specific requirement for pinning the plunger actuator cam on the shaft (the angle of the cam or the distance from the cam to the plunger); (2) revise procedure OP 1416.038 as necessary (due August 24, 2017); and (3) send breaker SA218 to the vendor to perform as-found testing of the breaker (due January 18, 2018).

On August 22, 2017, the vendor was contacted and stated there were no requirements for how the plunger actuator cam was pinned on the shaft. The criterion for adjusting the cam to achieve the correct plunger travel was already provided by the vendor and was correctly included in procedure OP 1416.038. Therefore, OP 1416.038 did not require revision, and the licensee concluded that no further actions were required.

On July 29, 2017, ANO-1 high-pressure injection (HPI) pump A breaker (SA109) failed to close. When the pump did not start, the licensee promptly placed the swing HPI pump into service in the A train. The licensee documented this condition in CR-ANO-1-2017-02331, immediately replaced breaker SA109 with a spare breaker, performed initial troubleshooting of breaker SA109, and performed an ACA. The licensee concluded the potential cause of breaker SA109 failure was a weakened closing spring based upon the information contained in CR-ANO-2-2015-05124.

As part of the corrective actions, the licensee sent breaker SA109 and SA218 to the vendor in early September 2017. From the vendor as-found testing it was determined that weakened closing springs caused breaker SA218 and SA109 failures. The licensee initiated Condition Report CR-ANO-C-2017-03385 to document this issue in the corrective action program and assessed operability of ANO-1’s and ANO-2’s safety-related 4160 volt Siemens vacuum breakers. The licensee concluded that there was a reasonable expectation of operability for the installed Siemens breaker and scheduled

work to replace the closing springs with the recommended yellow/red closing spring on a risk-informed basis, to be completed by February 6, 2018.

The inspectors reviewed the above information and concluded that the licensee did not promptly identify and correct a condition adverse to quality (CAQ). Specifically, the existence of multiple weakened breaker closing springs constituted a CAQ because the condition could (and did) reduce the reliability of safety-related breakers to close on demand. This condition was not identified as a condition adverse to quality between December 2015 and September 2017, and as a result, the licensee failed to take action to identify the affected breaker population and corrected the condition. Specifically:

- The licensee was slow to respond to the December 2, 2015, ANO-2 reactor building spray (RBS) pump A breaker failure, taking over a year to obtain all relevant failure information.
- In response to the vendor report received by the licensee in December 2016, the licensee failed to recognize that a condition adverse to quality existed and act to evaluate the possible impact to operability of installed safety-related breakers of the same age and model. Instead, the licensee chose to revise the breaker preventive maintenance procedure to provide guidance on how to react to evidence of future breaker failures or problems.
- In response to the Unit 2 RBS pump A breaker failure on May 30, 2017, the licensee promptly replaced the failed breaker and determined the closing spring force was weakened, but failed to identify this as a condition adverse to quality and take appropriate corrective action.
- In response to the July 29, 2017, failure of the Unit 1 HPI pump A breaker, the licensee promptly replaced the failed breaker. The inspectors promptly questioned the operability of the other installed Siemens vacuum breakers, but the licensee believed there was a reasonable basis for operability and stated that they wanted to review the results of planned vendor testing before taking further action. Despite multiple assurances by the licensee of placing a priority on getting those test results, the inspectors noted the breakers had not yet been shipped to the vendor a month after the HPI breaker failure.

The licensee entered this deficiency into the corrective action program as Condition Report CR-ANO-C-2018-00298.

The inspectors determined that both units had one train of Siemens vacuum breakers that were all the same model and all purchased from the same vendor at the same time, and that none of those breakers had original closing springs prior to the events described above. The inspectors concluded that the licensee did not recognize the risk associated with having multiple weak breaker closing springs, which represented a potential for a common mode failure in multiple systems. Instead, the licensee appeared to consider that promptly replacing the failed breakers removed the risk. Also, the inspectors concluded that the licensee was hesitant to consider the failure of breakers to close an actual problem until the vendor examined and tested the breakers. As a result, considerable period of time went by before breakers were sent to the vendor or action was taken. The delay created a situation where the conditions adverse to quality were not evaluated and corrected in a systematic manner.

Analysis. The licensee's failure to promptly identify and correct a condition adverse to quality associated with the safety-related 4160 volt Siemens vacuum breaker closing springs was a performance deficiency. The performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and adversely affected the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, the inspectors determined that the finding had very low safety significance (Green) because it: was not a design deficiency; did not represent a loss of system and/or function; did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time; and did not result in the loss of a high safety-significant, non-technical specification train. The finding had a cross-cutting aspect in the area of human performance associated with consistent process because the licensee failed to use a consistent, systematic approach, with risk insights incorporated as appropriate, to make decisions. Specifically, the licensee did not use the corrective action program and troubleshooting guidance consistently, systematically, and with consideration of appropriate risk insights to promptly identify and correct a CAQ associated with weakened breaker closing springs [H.13].

Enforcement. As required by 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, between December 2016 and September 2017, the licensee failed to promptly identify and correct a condition adverse to quality associated with weakened breaker closing springs in ANO-1 and ANO-2 safety-related 4160 volt Siemens vacuum breakers. This condition was identified in the vendor report received by the licensee in December 2016, but was not recognized as a condition adverse to quality until September 2017. During this time, two breaker failures occurred which were subsequently attributed to weak closing springs. This violation is being treated as a non-cited violation, consistent with Section 2.3.2.a of the Enforcement Policy, because it was very low safety significance (Green) and was entered into the licensee's corrective action program as Condition Report CR-ANO-C-2018-00298. (NCV 05000313/2017004-03; 5000368/2017004-03, "Failure to Promptly Identify and Correct a Condition Adverse to Quality")

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

.1 (Closed) Licensee Event Report (LER) 05000368/2017002-00, "Automatic Start of an Emergency Diesel Generator due to the Momentary Loss of Offsite Power due to Severe Weather"

a. Inspection Scope

On April 26, 2017, Arkansas Nuclear One, Unit 2, (ANO-2) was in Refueling Outage 25 with the reactor core completely offloaded to the spent fuel pool (SFP). Startup transformer (SU) 3 (one normal off-site power source) and the train B nonsafety-related 4160 volt bus 2A2 were out of service for planned maintenance. Off-site power to ANO-2 was supplied from SU 2 while SU 3 was out of service for planned maintenance. The area around the plant was experiencing severe weather from thunderstorms, and

tornado warnings had been issued from the National Weather Service for the general area.

At approximately 10:02 a.m. central standard time, switchyard breakers for the 500 kV lines opened on a fault current. High winds had damaged the transmission towers approximately 16 miles from ANO-2 and caused a phase to ground fault. This resulted in a loss of all offsite power lines to the 500 kV bus. When this occurred, the train A safety-related 4160 volt bus 2A3 was subjected to a voltage transient. This caused emergency diesel generator (EDG) 1 to automatically start. The EDG 1 output breaker did not close due to the fact that bus voltage was restored to normal, within the time delay associated with EDG 1 output breaker. The EDG was secured due to running unloaded, and both SFP cooling pumps were out of service during the transient. A SFP cooling pump was restored at 10:20 a.m. central standard time, and the SFP temperature remained constant during the event.

The licensee determined that EDG 1 automatically started due to a very short voltage transient on SU 2. The voltage lowered to approximately 149.8 kV and immediately restored to approximately 160 kV. SU 2 remained operable and capable of performing its required function.

The licensee reported this event under 10 CFR 50.73(a)(2)(iv)(A), "Any event of condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section. Paragraph (B)(8) of 10 CFR 50.73 lists "Emergency ac electrical power systems, including: EDGs". The inspectors reviewed the event, including station logs and technical specification requirements, walked down the affected components, and discussed the events with the licensee.

This licensee event report is closed.

b. Findings

No findings were identified.

.2 (Closed) LER 05000313/2017002-00 and 01, "High Pressure Injection Pump Inoperable for Greater Than Technical Specification Completion Time"

a. Inspection Scope

On May 27, 2017, the licensee attempted to start the P-36A HPI pump. Control room operators received annunciator, "HPI PUMP TRIP," and observed no indication of the pump starting. Upon further investigation, the licensee discovered the HPI pump breaker was not fully racked up. The licensee corrected this adverse condition, successfully started the HPI pump, and subsequently declared the HPI pump operable.

The licensee determined that an inadequate risk evaluation was performed for deciding to waive the post maintenance testing requirement after completing the HPI pump breaker racking evolution. Specifically, the licensee did not start the HPI pump after racking up its breaker to re-establish operability because the realignments are relatively complex and would introduce the potential for human error. According to Licensee Procedure COPD-001, "Operations Expectations and Standards," the shift manager had discretion to waive the requirement to retest the HPI pump based upon prescribed

criteria. The licensee took corrective actions to prevent recurrence by revising Procedure COPD-001 such that operations manager or assistant operations manager approval was required prior to waiving the requirement to start a load after racking in a breaker.

The licensee reported this failure under 10 CFR 50.73(a)(2)(i)(B), "Any operation or condition which was prohibited by the plants Technical Specifications," since the licensee was found to be in violation of Technical Specifications 3.0.4 and 3.5.2. The inspectors reviewed the event, including station logs and technical specification requirements, walked down the affected components, and discussed the events with the licensee.

One self-revealed NCV was previously identified and documented in NRC Integrated Inspection Report 05000313/2017002 and 5000368/2017002 as NCV 05000313/2017002-03, "Failure to Comply with ECCS Technical Specifications."

This licensee event report is closed.

b. Findings

No findings were identified.

These activities constituted completion of two event follow-up samples, as defined in Inspection Procedure 71153.

40A6 Meetings, Including Exit

Exit Meeting Summary

On November 9, 2017, the inspectors presented the radiation safety inspection results to Mr. C. O'Dell, Acting General Manager, Plant Operations, 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.

On November 15, 2017, the inspectors presented the cyber security follow-up inspection results to Mr. J. Stroud, Information Technology Manager, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors did not review any proprietary information.

On December 14, 2017, the inspectors presented the heat sink inspection results to Mr. R. Penfield, Director of Regulatory Performance Improvement, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

On January 8, 2018, the resident inspectors presented the inspection results to Mr. R. Anderson, 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.

40A7 Licensee-Identified Violations

The following licensee-identified violation of NRC requirements was determined to be of very low safety significance (Green) and meets the NRC Enforcement Policy criteria for being dispositioned as a non-cited violation:

- Arkansas Nuclear One, Unit 1 Technical Specification 5.4.1.a and Unit 2 Technical Specification 6.4.1.a requires, in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A to Regulatory Guide 1.33, "Quality Assurance Program Requirements," Revision 2, February 1978. Regulatory Guide 1.33, Appendix A, Section 8.b.(1)(h), requires that the licensee have specific written procedures to perform fire protection system functional tests. Procedure OP 1104.032, "Fire Protection System," Revision 86, Supplement 7, step 2.2, which implements this requirement, required licensee personnel to operate each of the valves listed in Table 1, including valve FS-21, through a complete cycle of full travel (i.e., shut and open). Contrary to the above, from September 18, 2017, to October 10, 2017, the licensee failed to fully cycle the fire protection system south main root isolation valve, FS-21. Specifically, operators shut but failed to reopen valve FS-21. The licensee's immediate corrective actions were to lock or seal open valve FS-21 and perform a valve line-up of the fire protection system. The licensee documented this issue in their corrective action program as Condition Reports CR-ANO-1-2017-03129 and CR-ANO-C-2017-03901.

Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, the inspectors determined that the finding had very low safety significance (Green) because it: was not a design deficiency; did not represent a loss of system and/or function; did not represent an actual loss of function of at least a single train for longer than its technical specification allowed outage time; and did not result in the loss of a high safety-significant, nontechnical specification train.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

R. Anderson, Site Vice President
L. Blocker, Nuclear Independent Oversight Manager
G. Brown, Security Manager
P. Butler, Design and Program Engineering Manager
B. Daiber, Engineering Programs and Components Manager
G. Doran, Radiation Protection Specialist
P. Ellison, Radiation Protection Acting Manager/Superintendent
T. Evans, Assistant to Site Vice President
M. Gibson, Radiation Protection ALARA Supervisor
M. Hall, Regulatory Assurance Licensing Engineer
T. Hatfield, Design and Program Engineering Supervisor
G. Hudnall, Corrective Action Program Manager
G. Kilpatrick, Training Manager
J. Kirkpatrick, General Manager, Plant Operations
P. McCray, Site Projects Senior Manager
S. Morris, Chemistry Manager
N. Mosher, Licensing Specialist
C. O'Dell, Acting General Manager, Plant Operations
B. Pace, Product Manager
R. Penfield, Regulatory and Performance Improvement Director
M. Phalen, Radiation Protection Department Head
S. Pyle, Regulatory Assurance Manager
L. Redman, Information Technology Specialist
R. Reynolds, Radiation Protection ALARA Specialist
R. Sebring, Radiation Protection Radwaste Supervisor
T. Sherrill, Emergency Planning Manager
B. Short, Senior Licensing Specialist
M. Skartvedt, System Engineering Manager
B. Stalmaker, Information Technology Specialist
J. Stroud, Information Technology Manager
D. Vogt, Senior Operations Manager
T. Whisler, Radiation Protection Supervisor of Support

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000313/2017004-01 URI Technical Specifications for Maximum Temperature of Service Water System When Aligned to Lake Dardanelle (Section 1R07)

Opened and Closed

05000313/2017004-02 05000368/2017004-02	FIN	Failure to Properly Plan Fire Water System Maintenance (Section 1R18)
05000313/2017004-03 05000368/2017004-03	NCV	Failure to Promptly Identify and Correct a Condition Adverse to Quality (Section 4OA2)

Closed

05000368/2017002-00	LER	Automatic Start of an Emergency Diesel Generator due to the Momentary Loss of Offsite Power due to Severe Weather (Section 4OA3)
05000313/2017002-01 05000313/2017002-00	LER	High Pressure Injection Pump Inoperable for Greater Than Technical Specification Completion Time (Section 4OA3)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
94-014	White Paper Design Basis Ambient Temperatures for the ANO Site	
95-6005	Limited Change Package	
CALC-89-D-2001-05	Intake Structure Ventilation	
CALC-89-D-2001-09	Unit 2 Intake Structure Environmental Temperature Study	
CALC-91-E-0090-01	Heat Load Determination for Rooms 2091, 2097, 2099, 2100, 2101, and 2104 for Post Accident Cooling	5
CALC-91-E-0090-02	ANO-2 EDG Ventilation	2
CALC-93-D-5015-02	Unit 1 Intake Structure Normal Heating and Ventilation	0
CALC-93-D-5015-06	Unit 1 Intake Structure Natural Convection Gothic Model	2
CALC-93-R-1006-01	Unit 1 Intake Structure Environmental Temperature Study	2
CALC-M-3600-137	Intake Structure Ventilation	
CALC-M-3600-139	Critical Ambient Temperature	

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
M-260	Piping and Instrumentation Air Flow Diagram HVAC Misc Areas	11
M-3600-1-36	Emergency Diesel Fuel Storage	January 16, 1990
MISC-94-014	White Paper Design Basis Ambient Temperatures for the ANO Site	
STM 1-42	Service and ACW Systems	
STM 1-47	Ventilation Systems	
ULD-1-SYS-01	Emergency Diesel Generator System	6
ULD-2-SYS-01	Emergency Diesel Generator System	9

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
2106.032	Unit 2 Freeze Protection Guide	027

Section 1R04: Equipment Alignment

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-M-3600-37	EDG Room Ventilation	1
M-260	Piping and Instrumentation Air Flow Diagram	11
ULD-1-SYS-01	Emergency Diesel Generators	6

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1104.036	EDG Operation	076
1106.006	Emergency Feedwater Pump Operation, Sheet 3, 4, and 5	M-204
1402.066	24 Month Inspection on Unit 1 EDG Engine	40

Condition Reports (CR-ANO-)

1-1995-00095	1-1995-00652	1-2004-02364	1-2006-00341	1-2006-00350
1-2009-01472	1-2012-00667	1-2015-03405	1-2016-00269	1-2016-00932
1-2016-01079	1-2016-01080	1-2016-01084	1-2016-05640	2-2012-00436

Condition Reports (CR-ANO-)

2-2012-00486 C-2004-00292 C-2004-00652 C-2004-02364 C-2016-05058
C-2017-03909

Section 1R05: Fire Protection

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
PFP-U1	ANO Prefire Plan (Unit 1)	19, 20
PFP-U2	AMP Prefire Plan (Unit 2)	16

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1000.120	ANO Fire Impairment Program	25

Work Orders

845961

Section 1R06: Flood Protection Measures

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-15-E-0007-15	Unit 1 Auxiliary Building EI. 335'-0" and 354'-0"	0
CALC-ANOC-15-0003	ANO Flood Protection Design Basis	5

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1203.054	Internal Flooding	2

Section 1R07: Heat Sink Performance

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
88-E-0098-20	ANO-1 DBA Reanalysis	0
91-E-0099-14	ECP Peak Temperature and Inventory Analysis	1

Calculations

<u>Number</u>	<u>Title</u>	<u>Revision</u>
91-R-2013-01	Service Water Performance Testing Methodology	28
95-R-0014-01	Unit 1 Decay Heat Cooler Heat Exchanger Test Protocol	4
97-E-0034-02	Water Hammer Analysis for GL96-06	1
ER0003292	Service Water Excessive Flow	4
ULD-I-TOP-04	ANO-1 Containment Response To Design Basis Accidents	7

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
EC-0000068327	1R26 As-Left Service Water Flow Test	0
EC-0000072776	2R25 As-Left Service Water Flow Test	0
ER-991916	ANO-1 DH Cooler Minimum SW Flow	0
ER-ANO-2000-2670-004	Common Loop Operation of CCW	0
LDCR1-1.4-0019	This Change Restores The Correct Description Of The Ultimate Heat Sink Consistent With SAR Amendment 1 And Section 9.3.4 Of The Original NRC SER	September 18, 2001
LO1-0090	Assure appropriate surveillance and maintenance requirements are implemented for maintaining the integrity, reliability, and availability of the Dardanelle Dam, Reservoir, and plant intake and discharge canals (this will need to be safety-related to be incorporated into the QA program).	November 19, 1999

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
OP-1104.029	Service Water Boundary Valve Leak Test	117
OP-1203.030	Loss Of Service Water	25
OP-1411.084	U1 Sluice Gate and SW Bay Cleaning and Inspection	15
OP-1608.007	Eradication of Fish and Algae at the Emergency Cooling Pond	8
OP-2203.022	Loss Of Service Water	14
OP-2305.034	Service Water Boundary Valve Leak Test	15
OP-2411.102	U2 Sluice Gate and SW Bay Cleaning and Inspection	14
OP-1306019.016	Annual Emergency Cooling Pond Sounding	16

Thermal Performance Analyses

<u>Number</u>	<u>Title</u>	<u>Revision/Date</u>
EC-ANO-0000040639	E-35B Thermal Performance Test Evaluation 1R23	0
EC-ANO-0000055127	1R25 E-35B Decay Heat Thermal Performance Evaluation	0
WO-ANO-52268764	System Engineering to Perform Thermal Testing of DH Cooler I	October 17, 2011
WO-ANO-52714457	Perform Monthly RB Cooling Units Flow Tests	August 20, 2017
WO-ANO-52719062	Perform Monthly RB Cooling Units Flow Tests	September 17, 2017
WO-ANO-52396269	System Engineering to Perform Thermal Testing of DH Cooler I	April 18, 2013

Vendor Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
TDW180 0040	Decay Heat Cooler Heat Exchanger Data Sheet	0

Condition Reports (CR-ANO-)

1-1999-00250	1-2017-03498	1-2017-03520	1-2017-03528	1-2017-03530
2-2017-05746				

Work Orders

51793704	52342300	52519193	52557091	52572506
52578876	52589944	52612597	52618652	52673780
52715946				

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

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
COPD-030	ANO Reactivity Management Program	9
SES-1-043HIT	Dynamic Exam Scenario	0

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1015.001	Conduct of Operations	114
1102.004	Power Operation	69
1106.009	Turbine Startup (Warmup and Roll)	55
1203.012H	Annunciator K09 Corrective Actions	47
1203.012I	Annunciator K10 Corrective Actions	56
1203.012K	Annunciator K12 Corrective Actions	49

Work Orders

52726789 52749557

Section 1R12: Maintenance Effectiveness

Miscellaneous Documents

<u>Title</u>	<u>Date</u>
Unit 1 A – 4160 VAC Maintenance Rule Basis Document	November 8, 2011
Unit 2 A – 4160 VAC Switchgear Maintenance Rule Basis Document	November 21, 2011

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1304.099	Unit 1 EFIC Channel B Calibration	30
1304.205	Unit 1 EFIC Channel A Monthly Test, SG Pressure Greater Than 750 psig	30
1304.206	Unit 1 EFIC Channel B Monthly Test, SG Pressure Greater Than 750 psig	56
1416.038	Siemens Vacuum Circuit Breaker Preventive Maintenance	0, 17
EN-DC-205	Maintenance Rule Monitoring	6
EN-MA-125	Troubleshooting Control of Maintenance Activities	21
EN-WM-101	On-Line Work Management Process	14, 15
ULD-1-SYS-08	ANO Unit 1 Emergency Feedwater Initiation and Control System	6

Condition Reports (CR-ANO-)

1-2016-03661	1-2016-03774	1-2016-04069	1-2017-00938	1-2017-02743
1-2017-03339	1-2017-03559	1-2017-03615	2-2015-05124	C-2017-03385

Work Orders

465634	482060	484558	484559	484560
484561	486113	52602756	52623289	

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1015.052	Passive Barrier Breach Permit	0
1107.001	Electrical System Operations	114
1203.012B	Annunciator K02 Corrective Action	44
1203.037	Abnormal ES Bus Voltage and Degraded Offsite Power	13
2203.054	Abnormal Grid	01
COPD-024	Risk Assessment Guidelines	64
EN-WM-104	On Line Risk Assessment	15
ULD-0-SYS-02	ANO Units 1 and 2 Offsite Power System	15

Condition Reports (CR-ANO-)

1-2017-03024	1-2017-03074	1-2017-03647	2-2017-05296	2-2017-05310
2-2017-05312	2-2017-05313	2-2017-05330	2-2017-05332	C-2017-04173

Work Orders

485961	52720086
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Section 1R15: Operability Determinations and Functionality Assessments

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
	Impairment Number 2017-0164	

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
Bulletin 89-02	Stress Corrosion Cracking of High-Hardness Type 410 Stainless Steel Internal Preloaded Bolting in Anchor Darling Model S350w Swing Check Valves or Valves of Similar Design	0
CALC-93-0031-01	P7A Pressure Rating and Maximum Operating Speed	1
ER-ANO-2002-1050-00	Shift Engineer Guidance for ESF Doors at Elevation 317 for Units 1 and 2	0
M-2011-4 Sh. 3	List of Material 2-stage 34H 7000 A.P.&L/Entergy Operations, Inc.	1
TDJ105 0010	Installation Manual – Storage Procedures – Product Lubrication – General Description & Spare Parts for Johnston Pump Company	1

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1015.052	Passive Barrier Breach Permit	0
1106.006	Emergency Feedwater Pump Operation	100
1306.019	Annual Emergency Cooling Pond Sounding	16
1402.100	Watertight Door Maintenance	9
2202.003	Loss of Coolant Accident	23
2203.013	Natural Circulation Operations	17
COPD-024	Risk Assessment Guidelines	64
EN-OP-104	Operability Determination Process	13

Condition Reports (CR-ANO-)

1-2017-02619	2-2016-01391	2-2016-03208	2-2016-03219	2-2017-03718
2-2017-03781	2-2017-03785	2-2017-03930	2-2017-04252	2-2017-04514
2-2017-05296	2-2017-05310	2-2017-05312	2-2017-05313	2-2017-05330
2-2017-05332	2-2017-05414	C-2017-04059		

Work Orders

52705982	52715947	52720086	52740345
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Section 1R18: Plant Modifications

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EC 70914	Temp Mod – Force Degraded NI-8 Signal to Zero and Defeat the Alarm Circuit to Allow NI-8 Power Supply to be Powered Down	0

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1105.005	Emergency Feedwater Initiation and Control System	43
1304.044	Unit 1 Reactor Protection System Channel D Calibration	51
EN-DC-136-ANO-RC	Temporary Modifications	4

Condition Reports (CR-ANO-)

1-2017-02675 1-2017-03468

Work Orders

465555

Section 1R19: Post-Maintenance Testing

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
ER-ANO-2002-1050-00	Shift Engineer Guidance for ESF Doors at Elevation 317 for Units 1 and 2	13
M-2011-4 Sh. 3	List of Material 2-stage 34H 7000 A.P.&L/Entergy Operations, Inc.	1
TDJ105 0010	Installation Manual – Storage Procedures – Product Lubrication – General Description & Spare Parts for Johnston Pump Company	1

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1106.006	Emergency Feedwater Pump Operation	100
1304.028	Unit 1 EFIC Channel D Monthly Test, SG Pressure Greater Than 750 PSIG	26, 56

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1304.040	Unit 1 Reactor Protection System Channel D Test	74
1304.044	Unit 1 Reactor Protection System Channel D Calibration	53
1304.101	Unit 1 EFIC Channel D Calibration	27
1416.038	Siemens Vacuum Circuit Breaker Preventive Maintenance	17
2104.029	Service Water System Operations, Supplement 8C, Service Water Pump 2P-4C Comprehensive Test	108
EN-WM-107	Post Maintenance Testing	5

Condition Reports (CR-ANO-)

1-2017-03024	1-2017-03074	1-2017-03542	2-2017-05296	2-2017-05310
2-2017-05312	2-2017-05313	2-2017-05330	2-2017-05332	2-2017-05364

Work Orders

484147	485002	485961	488164	488319
489431	51803722	52720086	52726877	

Section 1R22: Surveillance Testing

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Revision</u>
CALC-91-R-2013-01	Service Water Performance Testing Methodology	28
ER-ANO-2005-0287-003	2P-4C Wetend Replacement ER Evaluation	0
SEP-ANO-2-IST-1	ANO Unit 2 Inservice Testing Bases Document	3

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
1304.208	Unit 1 EFIC Channel D Monthly Test, SG Pressure Greater Than 750 psig	26
2104.029	Service Water System Operations	108
2104.029	Service Water System Operations, Supplement 8C, Service Water Pump 2P-4C Comprehensive Test	108

Condition Reports (CR-ANO-)

2-2017-05296	2-2017-05310	2-2017-05312	2-2017-05313	2-2017-05330
2-2017-05332	C-2016-05175			

Work Orders

52711890	52716863	52720086	52721315	52726877
52731528				

Section 2RS2: Occupational ALARA Planning and Controls

Audits and Self-Assessments

<u>Number</u>	<u>Title</u>	<u>Date</u>
	Annual Radiation Protection Assessment Report	May 23, 2017
LO-ALO-2017-00023	Self-Assessment: Radiation Safety – ALARA and Dose Assessment	September 11, 2017

Miscellaneous Documents

<u>Title</u>	<u>Date</u>
1R26 Outage ALARA Report	2016
2R25 Outage ALARA Report	2017
ALARA Managers Committee Meeting: Lower North Piping Penetration Smoke Detector Sensitivity Testing	November 7, 2017
ANO Full 5-Year Exposure Reduction Plan (2017-2021)	January 30, 2017
SDCHX Replacement Project Timeline	March 28, 2017

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-RP-105	Radiological Work Permits	18
EN-RP-110	ALARA Program	14
EN-RP-110-03	Collective Radiation Exposure (CRE) Guidelines	4
EN-RP-110-04	Radiation Protection Risk Assessment Process	7
EN-RP-110-06	Outage Dose Estimating and Tracking	1

Radiological Work Permit ALARA Packages

<u>Number</u>	<u>Title</u>
20161401	1R26 Radiation Protection Activities
20161420	1R26 Scaffold Installation/Removal (Non-LHRAs)
20161430	1R26 Refueling Activities
20161482	Laser Peening Unit 1 Reactor Vessel Bottom Mounted Instrumentation Nozzles
20161500	1R26 Replace E-29A & E-29B
20172420	2R25 Scaffold Installation/Removal (Non-LHRAs)
20172430	2R25 Refueling Path Activities
20172500	2R25 2E-35A/B Replacement Activities

Condition Reports (CR-ANO-)

1-2016-03290	1-2016-03348	1-2016-03630	1-2016-03968	1-2016-03994
1-2016-04607	1-2016-05242	1-2017-01817	1-2017-01909	1-2017-02357
1-2017-02500	2-2017-01191	2-2017-02178	2-2017-02765	2-2017-03269
2-2017-04634	2-2017-04750	C-2017-03100		

Section 2RS4: Occupational Dose Assessment

Audits and Self-Assessments

<u>Number</u>	<u>Title</u>
	Annual Radiation Protection Assessment Report
LO-ALO-2017-00023	Self-Assessment: Radiation Safety – ALARA and Dose Assessment

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
	Review of 2016 2 nd Half Area Monitoring Results	May 3, 2017
	Review of 2017 1 st Half Area Monitoring Results	October 27, 2017
ANO-2016-0028	ANO Neutron Assessment Report	
ANO-2017-0031	2016 Radiation Energy Distribution	March 1, 2017
ASLP-RPI-NMADA	Neutron Measurement & Dose Assessment	

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
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Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
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EN-RP-131	Air Sampling	15
EN-RP-201	Dosimetry Administration	5
EN-RP-202	Personnel Monitoring	13
EN-RP-203	Dose Assessment	10
EN-RP-204	Special Monitoring Requirements	11
EN-RP-205	Prenatal Monitoring	4
EN-RP-206	Dosimeter of Legal Record QA	7
EN-RP-208	Whole Body Counting / In-Vitro Bioassay	7
EN-RP-311	Electronic Alarming Dosimeter	2

Self-Reading Dosimeter Calibration Records

<u>Number</u>	<u>Title</u>	<u>Date</u>
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928736	Self-Reading Dosimeter	June 21, 2017
934662	Self-Reading Dosimeter	February 28, 2017
935226	Self-Reading Dosimeter	January 24, 2017
935306	Self-Reading Dosimeter	February 27, 2017
998274	Self-Reading Dosimeter	January 30, 2017

Condition Reports (CR-ANO-)

C-2015-03988	C-2015-04949	C-2015-04974	C-2016-00240	C-2016-00743
C-2016-03571	C-2016-04846	C-2017-00303	C-2017-00396	C-2017-00570
C-2017-00814	C-2017-02496	C-2017-03071	C-2017-03096	C-2017-03340
C-2017-03822	C-2017-04326	HQN-2015-00794	HQN-2015-01144	HQN-2016-01407

Section 4OA1: Performance Indicator Verification

Miscellaneous Documents

<u>Number</u>	<u>Title</u>
ANO2-SA-06-001	ANO-2 MSPI Basis Document Support Analysis
ECH-NE-09-00041	ANO1 Mitigation System Performance Index Basis Document

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-LI-114	Regulatory Performance Indicator Process	7, 8

Section 4OA2: Problem Identification and Resolution

Drawings

Title

Computer Support Building Cyber Cabinet Configuration
Control Room Component Topography Connection Drawings
Core Protection Calculator/Control Element Assembly Computer Data Flow
ORCA Communications Link
Plant Process Network with Maintenance Network
RDACS Network
Reactor Engineering Cyber Room
Safety Parameter Display System Computer Room
Site Owner Controlled Area Security System Network Overview

Miscellaneous Documents

<u>Number</u>	<u>Title</u>	<u>Date</u>
	Arkansas Nuclear One Cyber Security Plan	
LO-AL0-2017-00032	Cyber Security Self-Assessment	April 9, 2017

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-FAP-IT-009	Nuclear Cyber Security Terms and Definitions	4

Procedures

<u>Number</u>	<u>Title</u>	<u>Revision</u>
EN-FAP-IT-105	Computer System Walkdowns	1
EN-FAP-LI-001	Performance Improvement Review Group (PRG) Process	11
EN-IT-103	Nuclear Cyber Security Program	12
EN-IT-103-01	Control of Portable Digital Media Connected to Critical Digital Assets	11
EN-IT-103-04	Critical Digital Asset Technical Control Requirements	0
EN-IT-103-07	Cyber Security Physical Access Requirements for Critical Digital Assets Security Related Information – Withhold under 10 CFR 2.390	3
EN-LI-102	Corrective Action Program	29, 30
EN-MA-101	Conduct of Maintenance	20
EN-MA-125	Troubleshooting Control of Maintenance Activities	20
OP-1104.032	Fire Protection Systems	86, 87

Condition Reports (CR-ANO-)

1-2015-01620	1-2017-00270	1-2017-00287	1-2017-01230	1-2017-01236
1-2017-01265	1-2017-02795	1-2017-02883	1-2017-03129	1-2017-03456
1-2017-03575	2-2015-05124	2-2017-03236	2-2017-03643	2-2017-05208
C-2015-00535	C-2015-00758	C-2015-00864	C-2015-00949	C-2015-00963
C-2015-01037	C-2015-01051	C-2015-01052	C-2015-01053	C-2015-01055
C-2015-01240	C-2015-01619	C-2017-02164	C-2017-03385	C-2017-03901
C-2017-04125	C-2017-04126	C-2017-04135	HQN-2015-00097	HQN-2015-00104

Digital Equipment Evaluations (DEVAL)

2015-0031	2015-0032	2015-0042	2015-0111
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Work Orders

484558	484559	484560	484561	477395
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Section 40A3: Follow-up of Events and Notices of Enforcement Discretion

Condition Reports (CR-ANO-)

1-2017-01230

**The following items are requested for the
Occupational Radiation Safety Inspection
at Arkansas Nuclear One
(November 6 thru 9, 2017)
Integrated Report 2017004**

Inspection areas are listed in the attachments below.

Please provide the requested information on or before October 25, 2017.

Please submit this information using the same lettering system as below. For example, all contacts and phone numbers for Inspection Procedure 71124.01 should be in a file/folder titled "1- A," applicable organization charts in file/folder "1- B," etc.

If information is placed on *ims.certrec.com*, please ensure the inspection exit date entered is at least 30 days later than the onsite inspection dates, so the inspectors will have access to the information while writing the report.

In addition to the corrective action document lists provided for each inspection procedure listed below, please provide updated lists of corrective action documents at the entrance meeting. The dates for these lists should range from the end dates of the original lists to the day of the entrance meeting.

If more than one inspection procedure is to be conducted and the information requests appear to be redundant, there is no need to provide duplicate copies. Enter a note explaining in which file the information can be found.

If you have any questions or comments, please contact Natasha Greene at (817) 200-1154 or Natasha.Greene@nrc.gov. The other inspector will be John O'Donnell, and observed by Shawn Money.

PAPERWORK REDUCTION ACT STATEMENT

This letter does not contain new or amended information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing information collection requirements were approved by the Office of Management and Budget, control number 3150-0011.

2. Occupational ALARA Planning and Controls (71124.02)

Date of Last Inspection: October 3, 2016

- A. List of contacts and telephone numbers for ALARA program personnel
- B. Applicable organization charts
- C. Copies of audits, self-assessments, and LERs, written since date of last inspection, focusing on ALARA
- D. Procedure index for ALARA Program
- E. Please provide specific procedures related to the following areas noted below. Additional Specific Procedures may be requested by number after the inspector reviews the procedure indexes.
 - 1. ALARA Program
 - 2. ALARA Committee
 - 3. Radiation Work Permit Preparation
- F. A summary list of corrective action documents (including corporate and sub-tiered systems) written since date of last inspection, related to the ALARA program. In addition to ALARA, the summary should also address Radiation Work Permit violations, Electronic Dosimeter Alarms, and RWP Dose Estimates

NOTE: The lists should indicate the significance level of each issue and the search criteria used. Please provide in document formats which are “searchable” so that the inspector can perform word searches.
- G. List of work activities greater than 1 rem, since date of last inspection, Include original dose estimate and actual dose.
- H. Site dose totals and 3-year rolling averages for the past 3 years (based on dose of record)
- I. Outline of source term reduction strategy
- J. If available, provide a copy of the ALARA outage report for the most recently completed outages for each unit
- K. Please provide your most recent Annual ALARA Report.

4. Occupational Dose Assessment (Inspection Procedure 71124.04)

Date of Last Inspection: June 22, 2015

- A. List of contacts and telephone numbers for the following areas:
 - Dose Assessment personnel
- B. Applicable organization charts
- C. Audits, self-assessments, vendor or NUPIC audits of contractor support, and LERs written since date of last inspection, related to:
 - Occupational Dose Assessment
- D. Procedure indexes for the following areas:
 - Occupational Dose Assessment
- E. Please provide specific procedures related to the following areas noted below. Additional Specific Procedures will be requested by number after the inspector reviews the procedure indexes.
 - 1. Radiation Protection Program
 - 2. Radiation Protection Conduct of Operations
 - 3. Personnel Dosimetry Program
 - 4. Radiological Posting and Warning Devices
 - 5. Air Sample Analysis
 - 6. Performance of High Exposure Work
 - 7. Declared Pregnant Worker
 - 8. Bioassay Program
- F. List of corrective action documents (including corporate and sub-tiered systems) written since date of last inspection, associated with:
 - 1. National Voluntary Laboratory Accreditation Program (NVLAP)
 - 2. Dosimetry (TLD/OSL, etc.) problems
 - 3. Electronic alarming dosimeters
 - 4. Bioassays or internally deposited radionuclides or internal dose
 - 5. Neutron dose

NOTE: The lists should indicate the significance level of each issue and the search criteria used. Please provide in document formats which are "searchable" so that the inspector can perform word searches.
- G. List of positive whole body counts since date of last inspection, names redacted if desired
- H. Part 61 analyses/scaling factors
- I. The most recent National Voluntary Laboratory Accreditation Program (NVLAP) accreditation report or, if dosimetry is provided by a vendor, the vendor's most recent results

ARKANSAS NUCLEAR ONE – NRC INTEGRATED INSPECTION
 REPORT 05000313/2017004 and 05000368/2017004 DATED FEBRUARY 1, 2018

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