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

November 12, 2014

Mr. Jeremy Browning, Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
1448 SR 333
Russellville, AR 72802-0967

SUBJECT: ARKANSAS NUCLEAR ONE – NRC INTEGRATED INSPECTION REPORT 05000313/2014004 AND 05000368/2014004

Dear Mr. Browning:

On September 30, 2014, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Arkansas Nuclear One facility, Units 1 and 2. The NRC inspectors discussed the results of this inspection with you and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented three findings of very low safety significance (Green) in this report. These findings also involved violations of NRC requirements. Further, inspectors documented a licensee-identified violation which was determined to be of very low safety significance. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the NRC Enforcement Policy.

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

If you disagree with a cross-cutting aspect assignment 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 Regional Administrator, Region IV; and the NRC resident inspector at the Arkansas Nuclear One.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, “Public Inspections, Exemptions, Requests for Withholding,” a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC’s Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS).

ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Ryan E. Lantz, Chief
Project Branch E
Division of Reactor Projects

Docket Nos.: 50-313, 50-368
License Nos.: DRP-51; NPF-6

Enclosure:
Inspection Report 05000313/2014004 and
5000368/2014004 w/Attachments:

cc w/encl:
Electronic Distribution for Arkansas Nuclear One

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000313; 05000368
License:	DPR-51; NPF-6
Report:	05000313/2014004; 05000368/2014004
Licensee:	Entergy Operations Inc.
Facility:	Arkansas Nuclear One, Units 1 and 2
Location:	Junction of Hwy. 64 West and Hwy. 333 South Russellville, Arkansas
Dates:	July 1 through September 30, 2014
Inspectors:	B. Tindell, Senior Resident Inspector A. Fairbanks, Resident Inspector M. Young, Resident Inspector K. Clayton, Senior Operations Engineer T. Farina, Operations Engineer, Unit 2 Lead Inspector M. Hayes, Operations Engineer R. Kopriva, Senior Reactor Inspector B. Larson, Senior Operations Engineer, Unit 1 Lead Inspector R. Latta, Senior Reactor Inspector J. Melfi, Project Engineer J. Watkins, Reactor Inspector
Approved By:	R. Lantz, Chief Project Branch E Division of Reactor Projects

SUMMARY

IR 05000313/2014004; 05000368/2014004; 07/01/2014 - 09/30/2014; Arkansas Nuclear One, Units 1 and 2; Maintenance Effectiveness, Post-Maintenance Testing, Follow-up of Events.

The inspection activities described in this report were performed between July 1 and September 30, 2014, by the resident inspectors at Arkansas Nuclear One and inspectors from the NRC's Region IV office. Three findings of very low safety significance (Green) are documented in this report. All of these findings involved violations of NRC requirements. Additionally, NRC inspectors documented one licensee-identified violation of very low safety significance. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red), which is determined using Inspection Manual Chapter 0609, "Significance Determination Process." Their cross-cutting aspects are determined using Inspection Manual Chapter 0310, "Components Within the Cross-Cutting Areas." Violations of NRC requirements are dispositioned in accordance with the NRC Enforcement Policy. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

Cornerstone: Initiating Events

- Green. The inspectors documented a Green self-revealing non-cited violation of Technical Specification 6.4.1.a for the failure to implement procedures for changing load recommended by Regulatory Guide 1.33, Revision 2, Appendix A, Section 2.f, dated February 1978. Specifically, the licensee did not maintain axial shape index within the limits of the core operating limits report during a rapid power reduction at the end of core life, resulting in an automatic reactor trip. The issue was documented in Condition Report CR-ANO-C-2014-01142.

  The inspectors determined that the failure to maintain axial shape index within the limits of the core operating limits report during a rapid power reduction was a performance deficiency. The performance deficiency is more than minor because it is associated with the human performance attribute of the Initiating Events Cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge the critical safety functions during shutdown as well as power operations. Specifically, the failure to maintain axial shape index caused an automatic reactor trip. Using Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings at Power," Exhibit 1, "Initiating Events Screening Questions," the inspectors determined the finding to be of very low safety significance (Green) because the finding did cause a reactor trip but did not cause a loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition.

  The finding has a cross-cutting aspect in the area of human performance associated with training because the organization did not provide training and ensure knowledge transfer to maintain a knowledgeable, technically competent workforce. Specifically, the operators were not trained to understand the effects of the axial shape index during rapid power reductions with a core at an End-of-Life condition [H.9]. (Section 4OA3)

Cornerstone: Mitigating Systems

- Green. Inspectors documented a Green self-revealing non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to ensure activities affecting quality were accomplished in accordance with documented instructions. Specifically, the licensee failed to follow Job Order JO-00968863 for replacement of a prop spring in circuit breaker MA137. As a result, the wrong prop spring was replaced, reducing the reliability of the Unit 1 train B decay heat removal pump P-34B and ultimately causing a failure of the pump to start. The licensee corrected the condition by replacing the breaker and returning the pump to service. The issue was documented in Condition Report CR-ANO-1-2013-00701.

  The inspectors determined that the failure to follow Job Order JO-00968863 in 1998 for replacement of a prop spring in circuit breaker MA137 was a performance deficiency. The performance deficiency was more than minor because it was associated with the human performance 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, and was therefore a finding. Specifically, the failure to replace the appropriate prop spring in 1998 adversely affected the availability and reliability of Unit 1 decay heat removal pump P-34B and caused a failure to start in 2013. In accordance with Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings," Exhibit 3, "Mitigating Systems Screening Questions," the inspectors determined the finding to be of very low safety significance (Green) because the finding did not represent a loss of system safety function and did not represent an actual loss of safety function of at least one train for greater than its technical specification allowed outage time.

  The inspectors determined that there was no cross-cutting aspect associated with this finding because the cause of the performance deficiency occurred more than three years ago, and was not representative of current licensee performance. (Section 1R12)

- Green. Inspectors documented a Green self-revealing non-cited violation of Technical Specification 6.4.1.a for the licensee's failure to establish procedures recommended by Regulatory Guide 1.33, Revision 2, Appendix A, Section 9, February 1978. Specifically, the licensee failed to establish preventative maintenance procedures for valve internal inspection and testing of the Unit 2 main steam isolation valves. On December 23, 2013, the train A main steam isolation valve (2CV-1010-1) was declared Inoperable due to the valve sticking at fifteen percent open on multiple stroke attempts. The licensee's cause evaluation identified that mechanical binding and corrosion of the valve internals were results of a lack of preventive maintenance. The licensee repaired the 2CV-1010-1 valve and performed subsequent testing to demonstrate Operability. The issue was documented in Condition Report CR-ANO-2-2013-02502.

  The inspectors determined that the failure to establish preventative maintenance procedures for valve internal inspection and testing of the Unit 2 main steam isolation valves was a performance deficiency. The performance deficiency is more than minor because it was associated with the procedure quality 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,

and is therefore a finding. Specifically, the lack of preventative maintenance adversely affected the reliability of the main steam isolation valve 2CV-1010-1 to close within the time assumed in the accident analysis. Using Manual Chapter 0609, Attachment 4, “Initial Characterization of Findings,” and Appendix A, “The Significance Determination Process (SDP) for Findings at Power,” Exhibit 2, the inspectors determined the finding to be of very low safety significance (Green) because the finding did not represent the loss of a system safety function and did not represent an actual loss of safety function of at least one train for greater than its technical specification allowed outage time.

The finding was determined to have a cross-cutting aspect in the area of problem identification and resolution, in that the licensee failed to thoroughly evaluate issues to ensure that resolutions address causes commensurate with their safety significance. Specifically, during a previous stroke test of the 2CV-1010-1 valve in 2011, the licensee identified that the valve experienced a sluggish or jerky motion and took longer than normal to open. The licensee entered this issue into the corrective action program but did not fully evaluate and troubleshoot the condition adverse to quality to ensure resolution of the cause [P.2]. (Section 1R19)

Licensee-Identified Violations

A violation of very low safety significance (Green) and Severity Level IV 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 number are listed in Section 4OA7 of this report.

PLANT STATUS

Unit 1 operated at essentially full power during the inspection period.

Unit 2 operated at essentially full power during the inspection period.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R04 Equipment Alignment (71111.04)

.1 Partial Walk down

a. Inspection Scope

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

- July 15, 2014, Unit 1, reactor building spray, train A
- August 20, 2014, Unit 1, makeup tank outlet valve

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

b. Findings

No findings were identified.

.2 Complete Walkdown

a. Inspection Scope

On August 26, 2014, the inspectors performed a complete system walk-down inspection of the Unit 2 emergency feedwater system train A while train B was out of service. The inspectors reviewed the licensee's procedures and system design information to determine the correct system lineup for the existing plant configuration. The inspectors also reviewed outstanding work orders, open condition reports, and other open items tracked by the licensee's operations and engineering departments. The inspectors then visually verified that the system was correctly aligned for the existing plant configuration.

These activities constituted one complete system walk-down sample, as defined in Inspection Procedure 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Quarterly Inspection

a. Inspection Scope

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

- July 11, 2014, Unit 1, Fire Zone 97-R, cable spreading room
- July 23, 2014, Unit 1, Fire Zone 159-B, spent fuel area
- August 6, 2014, Unit 1, Fire Zone 120-E, boric acid addition tank and pump room
- August 27, 2014, Unit 1, Fire Zone 20-Y, auxiliary building, 335 foot

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.

.2 Annual Inspection

a. Inspection Scope

On August 7, 2014, the inspectors completed their annual evaluation of the licensee's fire brigade performance. This evaluation included observation of a Unit 2 announced fire drill for the alternate ac diesel generator room on August 7, 2014. During this drill, the inspectors evaluated the capability of the fire brigade members, the leadership ability of the brigade leader, the brigade's use of turnout gear and fire-fighting equipment, and the effectiveness of the fire brigade's team operation. The inspectors also reviewed whether the licensee's fire brigade met NRC requirements for training, dedicated size and membership, and equipment.

These activities constituted one annual inspection sample, as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

On August 13, 2014, the inspectors completed an inspection of the readiness and availability of a risk-significant heat exchanger. The inspectors observed and reviewed the data for a performance test of the Unit 1 train B emergency diesel generator jacket water heat exchanger, E-20B-2. Additionally, the inspectors walked down the heat exchanger to observe its performance and material condition, and verified that it was correctly categorized under the Maintenance Rule and was receiving the required maintenance.

These activities constitute completion of one heat sink performance annual review sample, as defined in Inspection Procedure 71111.07.

b. Findings

No findings were identified.

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

.1 Review of Licensed Operator Requalification

a. Inspection Scope

On September 24, 2014, the inspectors observed an evaluated simulator scenario performed by an operating crew on Unit 1. On July 16, 2014, the inspectors observed an evaluated simulator scenario performed by an operating crew on Unit 2. The inspectors assessed the performance of the operators and the evaluators' critique of their performance.

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

b. Findings

No findings were identified.

.2 Review of Licensed Operator Performance

a. Inspection Scope

The inspectors observed the performance of on-shift licensed operators in the plant's main control room. The inspectors observed the operators' performance of the following activities:

- July 25, 2014, Unit 2, moderator temperature coefficient testing
- August 13, 2014, Unit 1, emergency diesel generator, train B, quarterly test

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

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

b. Findings

No findings were identified.

.3 Biennial Inspection

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. During this inspection, Unit 1 was in the first part of the training cycle and Unit 2 was in the second part of the training cycle.

a. Inspection Scope

For Unit 1, inspectors observed portions of their 2014 operating test and 2013 comprehensive written examination. For Unit 2, inspectors observed portions of their 2014 operating test and comprehensive written examination. To assess the performance effectiveness of the licensed operator requalification program, inspectors conducted personnel interviews, reviewed medical records of licensed operators for conformance to license conditions, reviewed the minutes of training review group meetings to assess the responsiveness of the licensed operator requalification program to incorporate the lessons learned from both plant and industry events, reviewed examination security measures, simulator fidelity and existing logs of simulator deficiencies, and observed job performance measures and scenarios that were administered during the week of July 7, 2014. These observations allowed the inspectors to assess the licensee's effectiveness in conducting the operating test to ensure operator mastery of the training program content.

Inspectors reviewed the operating test results of both units and the results of the Unit 2 comprehensive written examinations. On September 16, 2014, the licensee informed the lead inspectors of the following results:

Unit 1:

- 54 total licensed operators
- 49 of 51 licensed operators passed all portions of their requalification examination (written, JPMs, or scenarios)
- 10 of 11 crews passed the simulator scenario portion of the operating test

Three licensed operators were not given a requalification examination since they are participating in the facility's senior reactor operator upgrade training program and, therefore, are not required to be tested. All three individuals are restricted from any

watchstanding duties. The two individuals and one crew that failed their simulator scenarios were remediated, retested, and passed retake tests prior to returning to shift.

Unit 2:

- 58 total licensed operators
- 57 of 58 licensed operators passed all portions of their requalification examination (written, JPMs, or scenarios)
- 11 of 11 crews passed the simulator scenario portion of the operating test

The individual that failed the comprehensive written examination was remediated, retested, and passed a retake examination prior to returning to shift.

Examination results for each unit were evaluated using the guidance contained in NRC Manual Chapter 0609, Appendix I, “Licensed Operator Requalification Significance Determination Process."

The inspectors completed one inspection sample of the biennial licensed operator requalification program for Unit 1 and one inspection sample of the biennial licensed operator requalification program for Unit 2.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed three instances of degraded performance or condition of safety-related structures, systems, and components (SSCs):

- August 1, 2014, Unit 1, emergency diesel generator and turbine driven emergency feedwater pump exhaust stacks
- August 28, 2104, Unit 2, turbine driven emergency feedwater pump
- September 19, 2014, Unit 1, decay heat pump breaker, train B

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

b. Findings

Introduction. Inspectors documented a Green self-revealing non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” for the licensee’s failure to follow work instructions for replacement of a prop spring in circuit breaker MA137. As a result, the wrong prop spring was replaced, reducing the reliability of the Unit 1 train B decay heat removal pump P-34B and ultimately causing a failure of the pump to start while the Unit 1 reactor coolant system was in a reduced inventory condition.

Description. On March 28, 2013, Unit 1 was in a reduced inventory condition. The licensee realigned decay heat removal pump P-34B to recirculate the borated water storage tank in preparation for refilling the reactor coolant system cold legs following steam generator nozzle dam installation. The pump failed to start after realignment. The licensee determined that circuit breaker MA137 failed to close and latch. Once the circuit breaker was replaced, the pump was restarted satisfactorily.

The licensee performed a high tiered apparent cause evaluation and determined that the failure to start was caused by improper replacement of the upper prop spring in circuit breaker MA137. In 1998, Job Order JO-00968863 was implemented to replace the upper and lower prop springs in accordance with General Electric Service Advisory Letter, GE SAL51.1A. The letter stated that the prop action could be altered to improve reliability of the breaker and eliminate random failures to latch. The upper prop spring was to be replaced with a heavier short spring that was designed to increase force. The licensee did not follow the instructions provided in Job Order JO 00968863, and installed the new increased force spring in place of the lower prop spring. The improper installation caused the circuit breaker to experience a failure to close and latch on March 28, 2013. Train A was in service removing decay heat when the failure occurred.

The licensee performed an extent of condition evaluation and determined that there were three other susceptible circuit breakers. One breaker was offsite, one was installed on nonsafety-related equipment, and the third breaker, MA138, was installed on the reactor building spray pump P-35B. The licensee replaced the affected reactor building spray pump breaker.

Analysis. The inspectors determined that the failure to follow Job Order JO-00968863 for replacement of a prop spring in circuit breaker MA137 was a performance deficiency. The performance deficiency was more than minor because it was associated with the human performance 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, and was therefore a finding. Specifically, the failure to replace the appropriate prop spring adversely affected the availability and reliability of Unit 1 decay heat removal pump P-34B and caused a failure to start. In accordance with Inspection Manual Chapter 0609, Attachment 4, “Initial Characterization of Findings,” and Appendix G, Attachment 1, “Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings,” Exhibit 3, “Mitigating Systems Screening Questions,” the inspectors determined the finding to be of very low safety significance (Green) because the finding did not represent a loss of system safety function and did

not represent an actual loss of safety function of at least one train for greater than its technical specification allowed outage time.

The inspectors determined that there was no cross-cutting aspect associated with this finding because the cause of the performance deficiency occurred more than three years ago, and was not representative of present licensee performance.

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," required, in part, that activities affecting quality be prescribed by documented instructions and be accomplished in accordance with these instructions. Job Order JO-00968863 prescribed replacement of the prop spring in circuit breaker MA137, an activity affecting quality. Contrary to the above, on April 13, 1998, the licensee failed to ensure activities affecting quality were prescribed by documented instructions and accomplished in accordance with these instructions. Specifically, the licensee failed to follow Job Order JO-00968863 for replacement of the prop spring in circuit breaker MA137. As a result, the wrong prop spring was replaced and the decay heat removal pump P-34B failed to start. The licensee corrected the condition by replacing the breaker and returning the pump to service. Additionally, another train of decay heat removal supplied sufficient cooling for decay heat removal. Because this finding is of very low safety significance and has been entered into the corrective action program as Condition Report CR-ANO-1-2013-00701, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000313/2014004-01, "Improper Maintenance on Circuit Breaker Caused Loss of Unit 1 Decay Heat Removal Pump."

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

a. Inspection Scope

On August 11, 2014, 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 for the Unit 2 auxiliary feedwater pump out of service.

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 result of the assessment.

Additionally, on September 14, 2014, the inspectors observed portions of one emergent work activity that had the potential to affect the functional capability of mitigating systems. Specifically, the alternate ac diesel generator programmable logic control failed to provide output to breaker trip logic.

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 SSCs.

These activities constitute completion of two 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 five operability determinations and functionality assessments that the licensee performed for degraded or nonconforming SSCs:

- August 4, 2014, Unit 2, operability determination for 120 VAC vital power panel breaker 2R-S201 current rating
- August 7, 2014, Unit 2, operability determination for untested condensate storage and transfer system valves
- August 8, 2014, Unit 2, functionality assessment for super particulate iodine and noble gas monitors 5, 6, and 11
- August 22, 2014, Unit 1, operability determination for high pressure injection potential unanalyzed condition
- August 28, 2014, Unit 2, operability determination for emergency feedwater pump turbine condensation in steam line

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

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

b. Findings

No findings were identified.

1R17 Evaluations of Changes, Tests, or Experiments and Permanent Plant Modifications (71111.17)

.1 Evaluations of Changes, Tests, or Experiments

a. Inspection Scope

The inspectors reviewed fourteen evaluations to determine whether the changes to the facility or procedures, as described in the Updated Final Safety Analysis Report, had been reviewed and documented in accordance with 10 CFR 50.59 requirements. The inspectors verified that, when changes, tests, or experiments were made, evaluations were performed in accordance with 10 CFR 50.59 and licensee personnel had appropriately concluded that the change, test, or experiment could be accomplished without obtaining a license amendment. The inspectors also verified that safety issues related to the changes, tests, or experiments were resolved. The team compared the safety evaluations and supporting documents to the guidance and methods provided in Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Implementation," as endorsed by NRC Regulatory Guide 1.187, “Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments," to determine the adequacy of the safety evaluations.

The inspectors reviewed twenty samples of changes, tests, and experiments that licensee personnel determined did not require evaluations and verified that the licensee personnel’s conclusions were correct and consistent with 10 CFR 50.59.

The inspectors also verified that calculations, analyses, design change documentation, procedures, the Updated Final Safety Analysis Report, the Technical Specifications, and plant drawings used to support the changes were accurate after the changes had been made. Documents reviewed are listed in the attachment.

These activities constitute completion of fourteen samples of evaluations and twenty samples of changes, tests, and experiments that were screened out by licensee personnel as defined in Inspection Procedure 71111.17-04.

b. Findings

No findings were identified.

.2 Permanent Plant Modifications

a. Inspection Scope

The inspectors verified that calculations, analyses, design change documentation, procedures, the Updated Final Safety Analysis Report, the Technical Specifications, and plant drawings used to support the modifications were accurate after the modifications had been made. The inspectors verified that modifications were consistent with the plant’s licensing and design bases. The inspectors confirmed that revised calculations and analyses demonstrated that the modifications did not adversely impact plant safety. Additionally, inspectors interviewed design and system engineers to assess the adequacy of the modifications.

These activities constitute completion of thirteen samples of permanent plant modifications as defined in Inspection Procedure 71111.17-04, and specific documents reviewed during this inspection are listed below.

.2.1 Unit 2 Weld Overlay Repair Of the Service Water Supply Piping to the #2 Emergency Diesel Generator Train B

The inspectors reviewed Change Package EC-0000030777, implemented to eliminate the leak, and provide a repair of the service water supply piping to the Unit 2, #2 Emergency Diesel Generator. This equivalent change evaluation evaluates the use of ASME Boiler and Pressure Vessel Code Case N-661-1, "Alternative Requirements for Wall Thickness Restoration of Classes 2 and 3 Carbon Steel Piping for Raw Water Service, Section XI, Division 1". This code case has been conditionally approved by the NRC per Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability ASME Section XI, Division 1, Revision 13," dated June 16, 2003, to perform a weld repair to eliminate the leakage and restore the piping to an acceptable condition. As identified in Condition Report CR-ANO-2-2011-2493, it was noted that there was a small amount of water leaking from the service water supply piping to the #2 Emergency Diesel Generator. The rate had been determined to be approximately 8 drops per minute. The actual leak was located in the vacuum degas effluent pump room across from the volume control tank room on the 354 elevation of Unit 2, in the auxiliary building. The flaw size had been documented by non-destructive examination UT Thickness Report 2-BOPUT-11-031, dated June 23, 2011. This section of piping was isolable. It was desirable to repair the leak to prevent any further degradation of the piping and to reduce any potential impacts to the service water system. The repair was a weld overlay in accordance with Code Case N-661-1. The inspectors confirmed the appropriate use of Code Case N-661-1 for the weld repair and did not identify any concerns with the change package.

.2.2 Unit 1 Motor Driven Feedwater Pump Servo Enclosure Vortex Cooler Tubing

The inspectors reviewed Change Package EC-0000031283, implemented to provide backup cooling to the EXLAR servo drive electronics enclosure. The vortex coolers use only compressed air and vortex tube technology to cool the cabinets. These coolers will back up the electric air conditioners mounted on the cabinets. This provides redundancy and diversity to maintain the operability of the main feedwater pump controls in conditions of high ambient temperature. The coolers require 35 Standard Cubic Feet per Minute (SCFM) of instrument air for single stage operation (2500 Btu/Hr) and 70 SCFM for dual stage operation (5000 Btu/Hr). The inspectors reviewed the evaluation of the engineering change package and did not identify any concerns with the change package.

.2.3 Unit 2 Engineering Evaluation To Document Acceptability Of Air Entering The Operating Charging Pump, Either 2P-36A/B/C

The inspectors reviewed Change Package EC-0000033517, implemented to evaluate the acceptability of the Unit 2 charging pump flow transients similar to those that have occurred following charging pump maintenance. Due to the piping configuration on the suction side of the charging pumps, there was a potential for air to be trapped below the charging pump suction valve if the system was breached during pump maintenance.

Operating procedures are used to fill and vent the system following maintenance, but these procedures were not completely effective in removing air trapped directly below the charging pump suction valves. The design objective to resolve the problem was to evaluate the acceptability of a limited amount of air passing through an operating charging pump following maintenance on an adjacent charging pump. The evaluation was based on the previous operating history of the charging pumps over the last 30 plus years of commercial operation, applicable industry experience, available vendor and industry recommendation associated with the susceptibility of positive displacement pumps to damage due to air ingestion, and existing operating procedure controls associated with system filling and venting. The inspectors reviewed the evaluation of the engineering change package and did not identify any concerns with the change package.

.2.4 Effects Of Site Maximum Ambient Of 113 Degrees Fahrenheit On Unit 1 Emergency Diesel Generator Combustion Air And Possible Derating

The inspectors reviewed Change Package EC-0000039238, implemented to evaluate elevated outside temperature conditions, which may require de-rating of the published emergency diesel generator service capacity ratings. During the 2012 Component Design Basis Inspection (CDBI) the NRC expressed a concern that the ANO-2 EDG combustion air system was not evaluated for the effects of the site extreme maximum outside air temperature of 113° Fahrenheit. Although this condition has been resolved for ANO-2, the effects of this maximum site temperature on the combustion air system for ANO-1 need to be documented. The change package was developed to determine the effects of the elevated ANO-1 EDG combustion air temperatures at the maximum site temperature of 113° Fahrenheit and make required document changes. The inspectors reviewed the evaluation of the engineering change package and did not identify any concerns with the change package.

.2.5 Alternate Forced Ventilation System For Unit 1 Battery, Direct Current and Switchgear Areas

The inspectors reviewed Change Package EC-0000041466, implemented to investigate a design solution to resolve emergency electrical area cooling issues. The first phase of the program was to install a subset of the required design modifications such that room temperatures would be within their design values with outside air temperature at the summer design condition of 100° Fahrenheit, but with the current compensatory measures (i.e. load shedding and door opening) still in place. The second phase implemented all remaining design modifications such that the room temperatures would be within their design values with outside air temperature at the summer design condition of 100° Fahrenheit with compensatory measures required. The inspectors reviewed the evaluation of the engineering change package and did not identify any concerns with the change package.

.2.6 Unit 1 Incorrect Body-Bonnet Stud Size On Decay Heat/Low Pressure Injection Block Valve CR-ANO-1-2013-01217 CA-03 Resolution

The inspectors reviewed Change Package EC-0000045122, implemented to provide a markup to the referenced calculations which document the qualification of the valves using the smaller 1.375 inches stud size. Calculation CALC-V-CV-1400-05, “Seismic Qualification of Valve Assembly CV-1400,” dated February 13, 1995, and

CALC-V-CV-1401-05, “Seismic Qualification of Valve Assembly 1401,” dated April 4, 1994, incorrectly assumed a body-bonnet stud size of 1.875 inches in diameter for decay heat/low pressure injection containment isolation block valves CV-1400 and CV-1401 respectively. Condition Report CR-ANO-1-2013-01217 was written to document this concern. Drawing FSK-M-1048 Sh.2, “Tubing Installation Details Decay Heat Removal Modification Valve CV-1401 Bonnet Leakoff”, dated July 30, 2013, was also impacted by this change, and was marked up to reflect the correct stud size via this engineering change notice. The valves remain seismically qualified with the 1.375 inches body-bonnet stud size. The inspectors reviewed the calculations condition reports and the drawing, and did not identify any concerns with the change package.

.2.7 Unit 1 Refuel 24 Evaluate Leak On Decay Heat Removal Check Valve DH-17 For Boric Acid Per Procedure EN-DC-319, “Boric Acid Corrosion Control Program”

The inspectors reviewed Change Package EC-0000046026, implemented to allow the current body-to-bonnet leakage associated with DH-17 to be in place for the duration of Fuel Cycle 25. During heat-up of the reactor coolant system, following Refueling Outage 1R24, check valve DH-17 was found to have a leak from the body-to-bonnet joint. The current leakage has been measured to be approximately two–five drops per minute. The leakage could not be repaired during 1R24 without a complete defuel of reactor vessel. Procedure EN-DC-319, “Boric Acid Corrosion Control Program,” Revision 10, Step 5.4.3.1 (4) states "If a component cannot be monitored and cannot be repaired prior to outage completion, then an engineering change evaluation (EVAL), sub-type (BOR) per EN-DC-115, is required to evaluate acceptability of the leak until the next outage (18 or 24 month cycle, as applicable)". This engineering change justified why it was acceptable to leave a small leak in containment during operating cycle 25. The inspectors reviewed the procedure, and the data collected pertaining to the leak and did not identify any concerns with the change package.

.2.8 Replace Unit 1 Battery Room Exhaust Fans Installed by Engineering Change EC-17162

The inspectors reviewed Change Package EC-0000033422, implemented to replace the Unit 1 battery room exhaust fans and air flow switches in the administration building and maintenance facility uninterruptable power supply (UPS) rooms to prevent accumulation of explosive levels of hydrogen buildup from the batteries. Engineering Change EC-17162 installed security electrical power source features associated with the licensee’s site security requirements. A part of the equipment change involved installation of new uninterruptable power supply systems for the administration building and maintenance facility. The new uninterruptable power supply system’s ventilation was required to be upgraded to prevent hydrogen buildup from the uninterruptable power supply batteries. Exhaust fan VEF-68 was installed in the administration building uninterruptable power supply room and exhaust fan VEF-69 was installed in the maintenance facility UPS room to provide the required airflow and paddle type flow switches FS-68 and FS-69 were installed to provide an alarm if their respective fans failed to provide the required exhaust flow. The original installed exhaust fans did not move sufficient air flow through the installed ductwork to actuate the paddle type flow switches associated with each fan. This modification replaces the fans with higher capacity fans and replaces the existing paddle type flow switches with differential pressure switches to detect duct static pressure when the fans are operating properly. The flow switches are connected to monitored computer points to alarm when inadequate airflow exists. The inspectors verified the electrical power requirements for

the larger fans would not exceed the existing breaker and conductor ampacities and verified that the new fans and flow switches were installed and tested correctly and that all equipment tags were properly changed. The inspectors did not identify any concerns with the change package.

.2.9 Unit 2 Unit Auxiliary (UAT) 2X-02 Breaker Replacement

The inspectors reviewed Change Package EC-00000042277, implemented to replace 52-1 General Electric (GE) model number THED136020 thermo-magnetic breaker with a magnetic only type molded case circuit breaker GE model number TEC36030 breaker to negate the de-rating caused by the local high ambient temperature. Breaker 52-1 is a 600 Vac, three-pole, 30 Amp, molded case circuit breaker and is used to supply power to the 12 cooling fans associated with the oil/air heat exchangers on Unit Auxiliary Transformer 2X-02 and is installed within the control cabinet located on Unit Auxiliary Transformer 2X-02. This control cabinet was installed adjacent to the fire wall near Unit Auxiliary Transformer 2X-02. The cooling fans blow air across the oil/air heat exchanger and the heated air is entrapped by the close proximity of the nearby fire wall and the exterior of the control cabinet and thus raises the ambient temperature of the equipment within the enclosure. The elevated temperature caused the thermal feature of the thermo-magnetic breaker to trip under normal operating currents which causes nuisance tripping of the cooling fans which led to higher operating temperatures for Unit Auxiliary Transformer 2X-02 and frequent resetting of the breaker. By replacing the thermo-magnetic breaker with a magnetic only breaker the effect of the elevated ambient temperature within the enclosure was eliminated and nuisance tripping of the cooling fans was eliminated. Prior to executing this modification the Unit Auxiliary Transformer 2X-02 experienced an unrelated catastrophic failure and was completely replaced. The new transformer, which had been previously purchased, was equipped with control equipment that monitors for elevated ambient temperatures in the area around the Unit Auxiliary Transformer 2X-02 and the associated fire wall. The inspectors walked down the installation of the new transformer to verify the installation met the requirements of the modification and was in accordance with the design. The inspectors did not identify any concerns with the change package.

.2.10 Installation Of Unit 1 Service Water System Return Isolation Valve SW-23 for Service Water System Boundary Check Valve SW-9

The inspectors reviewed Change Package EC-0000032588, implemented to install a Unit 1, manually operated, 14 inch, carbon steel, butterfly Service Water Return Isolation Valve SW-23, with associated slip on flanges in the service water return line from the intermediate cooling water coolers downstream of Service Water System Boundary Check Valve SW-9. This valve is safety-related and it functions as a normally open passive pressure boundary during normal operations, and as a maintenance boundary to isolate the intermediate cooling water service water return line and check valve SW-9 from the common service water return header during unit outages. The inspectors verified the design and performance requirements were appropriately reflected in the procurement and installation documentation and that post-installation testing was adequately performed. The inspector also confirmed that the licensee had revised their ASME Section XI program to include butterfly valve SW-23 as a pressure boundary component. The inspectors did not identify any concerns with the change package.

.2.11 Unit 2 Safety Injection Tank High Point Vent Piping Material Reconciliation

The inspectors reviewed Change Package EC-0000038258, implemented to provide drawing revisions that establish piping class line breaks and to reconcile material substitution associated with SI tank high point vent. Specifically, the modification included examination of the suitability of application for an alternate bar stock material with equivalent tensile and yield strengths. The inspectors examined the results of the engineering change notice and determined that bar stock material was an acceptable alternative to the piping fitting for this application. The inspectors also confirmed that the associated drawings had been appropriately revised and that design inputs were correctly selected and incorporated into the SI tank high point vent design. The inspectors did not identify any concerns with the change package.

.2.12 Replacement of the Unit 2 High Pressurization System Check Valves 2HPS-36/38 with Velan Valve

The inspectors reviewed Change Package EC-0000048670, implemented to replace check valves 2HPS-36 and 2HPS-38, which were check valves used in the High Pressure Safety Injection (HPSI) pressurization system on the high pressure system supply line to the HPSI discharge header and provide system boundary isolation of the HPSI system. The function of these check valves was to serve as a system flow path, maintain the system pressure boundary for both the high pressurization system and the HPSI system, and provide system back flow isolation for the HPSI system. The modification was precipitated by excessive seat leakage of the existing Kerotest check valves, identified during the performance of routine surveillance testing. The inspectors reviewed the component critical characteristics and the equipment change documentation associated with this modification and confirmed the equivalence of the replacement check valves. The inspectors also reviewed special processes controls and post-modification testing requirements. The inspectors did not identify any concerns with the change package.

.2.13 Add Detail For Installation Of Unit 2 Flood Barrier In Conduits

The inspectors reviewed Change Package EC-0000050342, implemented to install compensatory flood barriers in Unit 2 Turbine Building junction box 2JB300 and conduits H3005 and H3006. Specifically, the flood barriers were required to mitigate potential flooding in the Unit 2 Auxiliary Building due to both external and internal design basis floods. As documented in Condition Report CR-ANO-2-2014-00773, two six inch embedded conduits (H3005, H3006) located in junction box 2JB413 (elev. 329) in the Unit 2 Auxiliary Building were found with no seals (fire or flood). Subsequently, the other ends of these conduits which end in junction box 2JB300 (elev. 335), located in the Unit 2 Turbine Building, also did not have seals. The elevation of these conduits is below the maximum probable external flood elevation of 361 feet and also below the circulating water system component failure flood elevation of 358 feet 3 inches. Therefore, flood water could enter the auxiliary building through these conduits from the turbine building. Conduit H3005 contains three cables that feed the Unit 2 Circulating Water Pump Motor 2PM-3A. Conduit H3006 contains three cables that also feed the Unit 2 Circulating Water Pump Motor 2PM-3A. The inspectors reviewed the documentation associated with this modification including design basis considerations, critical characteristics, and operating experience. The inspectors did not identify any concerns with the change package.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

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

- July 16, 2014, Unit 1, high pressure injection pump P-36B after outboard seal replacement
- July 24, 2014, Unit 2, motor operated disconnect for service water pump 2P-4B after dc ground repair
- August 11, 2014, Unit 2, auxiliary feedwater pump following maintenance
- September 22, 2014, Unit 1, service water pump P-4B motor refurbishment

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

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

b. Findings

Introduction. Inspectors documented a Green self-revealing non-cited violation of Technical Specification 6.4.1.a for the licensee's failure to establish procedures recommended by Regulatory Guide 1.33, Revision 2, Appendix A, Section 9, February 1978. Specifically, the licensee failed to establish preventative maintenance procedures for valve internal inspection and testing of the Unit 2 main steam isolation valves.

Description. After a shutdown on December 23, 2013, to repair a steam leak, the train A main steam isolation valve 2CV-1010-1 was stroked in Mode 4 prior to entering Mode 3, and the valve stuck at fifteen percent open and continued to stick on four successive attempts. The valve was declared inoperable, and the plant went to Mode 5 for troubleshooting and repairs. The licensee replaced the piston guide rings and hand buffed the internal valve body to remove gouges. After repairs to the 2CV-1010-1 valve, the valve was declared operable based on diagnostic testing data and three successful stroke times in Mode 5.

The licensee identified through their root cause that the lack of preventative maintenance on the valve internals resulted in mechanical binding and corrosion of the

internals. There were indications of scoring and gouging on both the valve internal body and the piston assembly. Also, the piston guide rings were seized in place due to debris and swelling. The Unit 2 MSIV internals have been installed since initial plant operation.

In 2011, Condition Report CR-ANO-C-2011-01549 was written to document that 2CV-1010-1 experienced a sluggish or jerky motion and took longer than normal to open during a plant heat up stroke test after the 2R21 outage. The valve's closing time was within the requirements, and several other strokes afterwards did not show sluggish opening. Therefore, the licensee issued a corrective action to replace the actuator, which was already scheduled for 2R22, and diagnostically test the valve after replacement. The replacement was deferred and the condition report was closed to work order WO 272324.

In January 2013, Condition Report CR-ANO-C-2013-00225 was written to document that the MSIVs are susceptible to mechanical binding based on a review of operating experience. In June 2013, the licensee issued a corrective action to perform diagnostic testing to determine the overall condition of the valves.

A historical review of valve stroke times did not provide indication of degradation and the valve was successfully stroked prior to downpowering. Therefore, the inspectors confirmed the licensee's conclusion that the main steam isolation valve 2CV-1010-1 did not exceed technical specifications allowed outage time.

An extent of condition review was performed for the train B main steam isolation valve 2CV-1060-2, and it underwent diagnostic testing prior to disassembling the valve, which proved past operability. Subsequently, the licensee replaced the piston guide rings and hand buffed the internal valve body. After repairs to the 2CV-1060-2 valve, the valve was declared operable based on diagnostic testing data and three successful stroke times in Mode 5. The licensee confirmed that Unit 1 does not have the same MSIVs and had replaced the valve internals in 1999.

Analysis. Inspectors concluded that the failure to establish preventative maintenance procedures for valve internal inspection and testing of the Unit 2 main steam isolation valves was a performance deficiency. The performance deficiency is more than minor because it was associated with the procedure quality 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, and is therefore a finding. Specifically, the lack of preventative maintenance adversely affected the reliability of the main steam isolation valve 2CV-1010-1 to close within the time assumed in the accident analysis. Using Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings at Power," Exhibit 2, the inspectors determined the finding to be of very low safety significance (Green) because the finding did not represent the loss of a system safety function and did not represent an actual loss of safety function of at least one train for greater than its technical specification allowed outage time.

The finding was determined to have a cross-cutting aspect in the area of problem identification and resolution, in that the licensee failed to thoroughly evaluate issues to ensure that resolutions address causes commensurate with their safety significance. Specifically, during the 2CV-1010-1 stroke test in 2011, the valve experienced a sluggish

or jerky motion and took longer than normal to open. The licensee entered this issue into the corrective action program as Condition Report CR-ANO-2-2011-1549 but did not fully evaluate and troubleshoot the condition adverse to quality to ensure resolution of the cause [P.2].

Enforcement. Technical Specification 6.4.1.a requires, in part, that written procedures be established covering the activities in Regulatory Guide 1.33, Revision 2, Appendix A, dated February 1978. Regulatory Guide 1.33, Appendix A, Section 9, specifies that procedures for performing maintenance that can affect the performance of safety-related equipment should be properly pre-planned and completed in accordance with written procedures and documented instructions appropriate to the circumstances. Contrary to the above, the licensee failed to establish procedures covering maintenance activities that could affect the performance of safety-related equipment. Specifically, the licensee failed to establish preventative maintenance procedures for the Unit 2 main steam isolation valves to ensure the valves remain operable. After repairs to the 2CV-1010-1 valve, diagnostic testing and stroke tests were performed to show operability of the valve prior to entering Mode 3. Because this finding is of very low safety significance and has been entered into the corrective action program as Condition Report CR-ANO-2-2013-02502, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy:
NCV 05000368/2014004-02, "Failure to Establish Preventative Maintenance on Unit 2 Main Steam Isolation Valves."

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

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

Reactor coolant system leak detection tests:

- August 22, 2014, Unit 1, reactor coolant system leak detection
- August 22, 2014, Unit 2, reactor coolant system leak detection

Other surveillance tests:

- July 25, 2014, Unit 2, moderator temperature coefficient testing
- August 5, 2014, Unit 1, core flood tanks, trains A and B, boron samples
- August 8, 2014, Unit 2, accident monitoring instrumentation verification
- August 13, 2014, Unit 1, emergency diesel generator, train B

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

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

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

Training Evolution Observation

a. Inspection Scope

On September 24, 2014, the inspectors observed Unit 1 simulator-based licensed operator requalification training that included implementation of the licensee's emergency plan. The inspectors verified that the licensee's emergency classifications, off-site notifications, and protective action recommendations were appropriate and timely. The inspectors verified that any emergency preparedness weaknesses were appropriately identified by the evaluators and entered into the corrective action program for resolution.

These activities constitute completion of one training observation sample, as defined in Inspection Procedure 71114.06.

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: Emergency AC Power Systems (MS06)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of July 1, 2013, through June 30, 2014, 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 emergency ac power systems for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index: High Pressure Injection Systems (MS07)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of July 1, 2013, through June 30, 2014, 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 high pressure injection systems for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index: Heat Removal Systems (MS08)

a. Inspection Scope

The inspectors reviewed the licensee's mitigating system performance index data for the period of July 1, 2013, through June 30, 2014, 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 heat removal systems for Units 1 and 2, as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152)

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.

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

(Closed) Licensee Event Report 05000368/2014-003-00, Axial Shape Index Trip at the End-of-Life During Rapid Plant Shutdown

a. Inspection Scope

On April 27, 2014, Arkansas Nuclear One, Unit 2 was at the end of the core life and was operating at approximately 95 percent power when the System Operations Center Dispatcher informed the licensee of a system wide grid emergency due to severe weather and ordered both Units 1 and 2 to come off-line as soon as possible. During the downpower, Unit 2 experienced an automatic reactor trip from 46 percent power due to exceeding the core protection calculator axial shape index (ASI).

The licensee concluded that the ASI trip was due to not effectively executing their reactivity management plan. This was caused by the lack of specific training and understanding the magnitude and rate of ASI shift that occurs at the end of a fuel cycle. The approved reactivity plan noted control element assembly (CEA) positions that were necessary to maintain ASI on target through the downpower. The operator delayed CEA insertion over the initial interval because it was noted that ASI was tracking closely with the target equilibrium shape index early into the maneuver. This delay in CEA insertions directly contributed to the challenges associated with maintaining ASI in the desired control band which ultimately led to the automatic reactor trip. The licensee has initiated a corrective action to improve its' reactivity plan and provide operator training on end of core life rapid reactor shutdowns. This licensee event report is closed.

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

b. Findings

Introduction. The inspectors documented a Green self-revealing non-cited violation of Technical Specification 6.4.1.a for the failure to implement procedures for changing load recommended by Regulatory Guide 1.33, Revision 2, Appendix A, Section 2.f, dated February 1978. Specifically, the licensee did not maintain ASI within the limits of the core operating limits report limits (COLR) during a rapid power reduction at the end of core life, resulting in an automatic reactor trip.

Description. On April 27, 2014, the System Operations Center informed the licensee of a system wide grid emergency and ordered both Units 1 and 2 to come off line as soon as possible. Both units commenced a rapid plant shutdown. Unit 2 was at 95 percent power at the end of core life (EOL) at the time of this notification. At EOL, the effect of a decrease in plant power on ASI is greater than at any other time in the cycle. Therefore, controls must be employed to maintain ASI within the core operating limits and prevent a trip.

Unit 2 commenced the rapid power reduction in accordance with OP-2102.004, “Power Operations,” Revision 56, Section 12, “Emergent Power Reductions,” and the guidance from an approved 1-hour shutdown contingency reactivity plan.

ASI describes the axial power distribution of the reactor core and is defined as the power generated in the lower half of the core minus the power generated in the upper half of the core divided by the sum of these powers. Four CPC channels receive an input from their respective excore nuclear instruments and perform an ASI calculation. Two CPC channels exceeding the ASI setpoint will result in a reactor trip.

The reactivity plan stated that operators begin with an emergency boration and insert the CEAs 17 to 19 inches for each insertion to obtain targeted positions at fifteen minute intervals. This reactivity plan was expected to keep ASI from being exceeded. The reactor operator delayed CEA insertion over the initial interval because ASI was tracking closely with the target equilibrium shape index as described in the COLR. This delay in CEA insertions was determined to be a direct contributor to the failure to maintain ASI in the desired control band. Approximately thirty minutes into the power reduction, at approximately 46 percent power, CPC channel ‘C’ tripped due to ASI. The shift manager evaluated the situation and directed a manual reactor trip, but prior to the manual trip an automatic reactor trip occurred when CPC channel ‘D’ tripped from ASI.

In discussions with the licensee, the inspectors concluded that not inserting CEAs as directed by the reactivity plan, and lack of operator knowledge of the magnitude of the temperature-driven ASI during EOL conditions, resulted in the ASI limit being exceeded. The licensee also determined that the licensee’s training program did not train operators for rapid shutdowns at EOL conditions. The licensee had practiced middle of core life rapid shutdowns on the simulator, which would not be as demanding as EOL conditions.

Analysis. The inspectors determined that the failure to maintain axial shape index within the limits of the core operating limits report during a rapid power reduction was a performance deficiency. The performance deficiency is more than minor because it is associated with the human performance attribute of the initiating events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge the critical safety functions during shutdown as well as power operations. Specifically, the failure to maintain axial shape index caused an automatic reactor trip. Using Manual Chapter 0609, Attachment 4, “Initial Characterization of Findings,” and Appendix A, “The Significance Determination Process (SDP) for Findings at Power,” Exhibit 1, “Initiating Events Screening Questions,” the inspectors determined the finding to be of very low safety significance because the finding did cause a reactor trip but did not cause a loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition.

The finding has a cross-cutting aspect in the area of human performance associated with training because the organization did not provide training and ensure knowledge transfer to maintain a knowledgeable, technically competent workforce. Specifically, the operators were not trained to understand the effects of the axial shape index during rapid shutdowns with a core at an EOL condition [H.9].

Enforcement. Technical Specification 6.4.1.a requires, in part, that written procedures be implemented covering the activities in Regulatory Guide 1.33, Revision 2, Appendix A, dated February 1978, Regulatory Guide 1.33, Appendix A, Section 2.f,

recommends general operating procedures be established and implemented for changing load and load follow (if applicable). Contrary to the above, on April 27, 2014, the licensee failed to implement general operating procedures for changing load and load follow. Procedure OP-2102.004, Power Operation," Revision 56, Section 12, "Emergent Power Reduction," Step 12.7 states, "Maintain ASI (PID 268) within Core Operating Limits Report (COLR) limits using CEA Group 6 or Group P." Specifically, the licensee did not maintain axial shape index in accordance with the limits of the core operating limits report during a rapid power reduction, which resulted in an automatic reactor trip. The licensee took immediate corrective actions to enhance the procedural guidance, brief operating crews on following reactivity plans, and the effects of end-of-life core conditions on axial shaping index. Because this violation is of very low safety significance and has been entered into the corrective action program as Condition Report CR-ANO-C-2014-01142, this violation is being treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000368/2014004-03, "Failure to Implement Procedural Requirements for Axial Shape Index during a Rapid Power Reduction."

4OA6 Meetings, Including Exit

Exit Meeting Summary

On August 7, 2014, the inspectors presented the Evaluations of Changes, Tests, or Experiments and Permanent Plant Modifications preliminary inspection results to Mr. D. James, Director, Regulatory and Performance Improvement, and other members of the licensee's staff. The licensee acknowledged the results as presented. While some proprietary information was reviewed during this inspection, no proprietary information was included in this report.

The inspectors debriefed Mr. D. James, Director, Regulatory and Performance Improvement, and other members of the licensee's staff of the results of the licensed operator requalification program inspection on July 11, 2014, and telephonically exited with Mr. R. Martin, Operations Training Superintendent, on September 18, 2014. The licensee representative acknowledged the findings presented. The inspectors did not review any proprietary information during this inspection.

On September 25, 2014, the inspectors presented the inspection results to Mr. J. Browning and other members of the licensee staff. The licensee acknowledged the issues presented. The licensee confirmed that any proprietary information reviewed by the inspectors had been returned or destroyed.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) and Severity Level IV was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy, for being dispositioned as a Non-Cited Violation.

Title 10 CFR 55.49, "Integrity of Examinations," requires, in part, that facility licensees shall not engage in any activity that compromises the integrity of any application, test, or examination required by this part. Contrary to the above, on June 24, 2014, the licensee caused a compromise to examination integrity by violating an examination security agreement to not divulge information about examination content to unauthorized individuals. The failure to meet 10 CFR 55.49 was evaluated through the traditional enforcement process because it

impacted the ability of the NRC to perform its regulatory oversight function. This resulted in assignment of a Severity Level IV violation because it involved a non-willful compromise of examination integrity and is consistent with Section 6.4.d of the NRC Enforcement Policy.

The associated performance deficiency was screened as Green because there was not an actual effect on the equitable and consistent administration of any examination required by 10 CFR 55.59, “Requalification.” The licensee entered this issue into their corrective action program as Condition Report CR-ANO-1-2014-01062.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
D. Bice, Senior Licensing Specialist, Regulatory Assurance
M. Bhatti, Senior Lead Engineer, Design Engineering
E. Blackard, Plant Programs Supervisor, Design Engineering
R. Buser, Senior Lead Design Engineer, Design Engineering
B. Daiber, Design and Program Manager, Engineering
D. James, Director, Regulatory and Performance Improvement
R. Keele, Superintendent, Operations Training
R. Martin, Operations Training Superintendent
J. McCoy, Engineering Director, Engineering
E. Nicholson, HU Coordinator, Performance Improvement
C. O'Dell, Senior Manager Production, Production
S. Pyle, Manager, Regulatory Assurance
J. Seiter, Senior Licensing Specialist, Regulatory Assurance
M. Stang, Scheduler/Coordinator, Electrical Maintenance
P. Williams, Manager, Operations
J. Wright, Operations Training

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000313/2014004-01	NCV	Improper Maintenance on Circuit Breaker Caused Loss of Unit 1 Decay Heat Removal Pump (Section 1R12)
05000368/2014004-02	NCV	Failure to Establish Preventative Maintenance on Unit 2 Main Steam Isolation Valves (Section 1R19)
05000368/2014004-03	NCV	Failure to Implement Procedural Requirements for Axial Shape Index during a Rapid Power Reduction (Section 4OA3)

Closed

05000368/2014-003-00	LER	Axial Shape Index Trip at the End-of-Life During Rapid Plant Shutdown

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

Procedures

Number	Title	Revision
TD L200.0030	Instruction and Maintenance Manual Limitorque Type SMB	3

Procedures

Number	Title	Revision
B087	EQ Data Record Summary Sheet	4
M-236	Piping & Instrument Diagram Reactor Building Spray and Core Flooding Systems	93
1104.005	Reactor Building Spray System Operation	72
1104.002	Makeup and Purification System Operation	83
1202.006	Tube Rupture	15
1202.012	Repetitive Tasks	13
2106.006	Emergency Feedwater System Operations	85
STM 2-19-2	EFW & AFW Systems	29

Condition Reports

CR-ANO-2-2013-01548 CR-ANO-2-2014-00853 CR-ANO-2-2014-02546

Section 1R05: Fire Protection

Procedures

Number	Title	Revision
1a-372-97-r.doc	Unit 1 Cable Spreading Room & Relay Room	2
1A-404-159-B	Unit 1 Prefire Plan for Spent Fuel Area	16
1405.016	Unit 1 Penetration Fire Barrier Visual Inspection	019
1A-386-120-E.doc	Boric Acid Addition Tank & Pump Room	2
3-AACGB.doc	Alternate AC Generator Building	2

Drawings

Number	Title	Revision
FZ-1043	Fire Zone Detail Cable Spreading Room	2
FZ-1039	Fire Zone Detail Fuel Handling Area, & Upper So. Electrical Penetration Rm.	2
FZ-1054	Fire Zone Detail Fuel Handling Area	2
FZ-1041	Fire Zone Detail No. & So. Emer. Diesel Gen Exh. Fan Tank & Pump Rm., Stair No 1, Respir. Clean Rm., Upper No. Elec. Penet. Rm., Hot Tool Rm., Decon Rm.	2
FZ-3040	Fire Zone Detail Alternate Generator Building	3

Miscellaneous

Number	Title	Revision
FHA	Unit 1 & Unit 2 Fire Hazards Analysis	16

Condition Reports

CR-ANO-1-2014-01135 CR-ANO-1-2014-01316

Work Orders

52302945 52200549 52302934

Section 1R07: Heat Sink Performance

Procedure

Number	Title	Revision
OP-13009.018	EDG Cooler Thermal Test	008

Calculations

Number	Title	Revision
EC 46426	Thermal Performance Analysis of EDG Coolers E-20A-1/2 & E-20B-1/2	0
CALC- 91-R-2013-01	Service Water Performance Testing Methodology	26

Drawing

Number	Title	Revision
M-217, Sh. 3	Emergency Diesel Generators K-4B (DG-2)	23

Miscellaneous

Number	Title	Revision
TD E147.0010	Operating Manual Stationary Power Generating Units (AB20 Generators) Power Take-off Units Cooling System	0

Work Order

52504345-01

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

Procedures

Number	Title	Revision
OP-2202.002	Reactor Trip Recovery	10
OP-2202.003	Loss of Coolant Accident	14
OP-2202.004	Steam Generator Tube Rupture	14
OP-2202.001	Functional Recovery	22
OP-2203.032	Emergency Boration	11
OP-2203.038	Primary to Secondary Leakage	14
OP-2302.009	Moderator Temperature Coefficient at Power	029
COPD-030	Reactivity Management Program	007
OP-1015.001	Conduct of Operations	101
SES-1-CPE4	Unit 1 Crew Performance Evaluation Scenario	1

Procedures

Number	Title	Revision
1015.050	Time Critical Operator Actions Program	3
1063.008	Operations Training Sequence	42
EN-TQ-114	Licensed Operator Requalification Training Program Description	9
EN-TQ-200	Training Oversight Program	19
EN-TQ-201	Systems Approach to Training Program	11
EN-TQ-202	Simulator Configuration Control	9
EN-TQ-210	Conduct of Simulator Training	8
EN-TQ-212	Conduct of Training and Qualification	13
EN-TQ-217	Examination Security	4
EN-NS-112	Medical Program	12
DG-TRNA-4.5	Simulator Training Aids	17
DG-TRNA-15-CORETEST	Simulator Core Reload Acceptance Test	3

Procedures

Number	Title	Revision
DG-TRNA-15-SIMCONTROL	Simulator Modification Control	6
DG-TRNA-15-EXAMSEC	Simulator Exam Security Guidelines	8
DG-TRNA-217	Exam Security	0
TQF-201-IM05	Remedial Training Plan	8
TQF-201-IM06	Academic Review Board Recommendation	7
TQF-210-DD03	LOR Simulator Crew Performance Evaluation Report	3
TQF-210-DD04	LOR Simulator Crew Performance Evaluation Report	2
TQF-210-DD05	LOR Simulator Crew Performance Evaluation Report	2

Miscellaneous Documents

Number	Title	Revision/Date
Unit 2 2014 AOT Simulator Scenarios	Weeks 1-6	July 2014
Unit 2 2014 AOT JPMs	Weeks 1-6	July 2014
Unit 2 2013 AOT Simulator Scenarios	Weeks 1-6	July 2013
Unit 2 2013 AOT JPMs	Weeks 1-6	July 2013
1301	Unit 2 2014 Biennial Exam Sample Plan	June 26, 2014
Simulator Test	Unit 2 Steady State 100 Percent Power	December 2012
Simulator Test	ANO2 Sim Core Reload Acceptance Test Cycle 24	July 2, 2014
Simulator Test	Unit 2 Transient Test Trip of all Feed Pumps (TT2)	December 2012
Simulator Test	Unit 2 Slow Primary Depressurization (TT10)	December 2012
DR-2013-0078	Simulator Closed Work Package	May 7, 2013
DR-2014-0102	Simulator Open Work Package	June 10, 2014

Miscellaneous Documents

Number	Title	Revision/Date
N/A	Plant Events and Industry Experience LOR U2	N/A
Unit 2 Biennial Written Exam	Week 1	June 2014
OLTS Report 14	License Restriction Report (Units 1 & 2)	July 2, 2014
OLTS Report 17	Renewal Tracking Report (Units 1 & 2)	July 2, 2014
TQF-200-LORTAC	LOR Training Advisory Committee Minutes 1Q14	5
TQF-200-LORTAC	LOR Training Advisory Committee Minutes 4Q13	5
N/A	Watchstanding Records – Crew B	July 2014
N/A	Unit 1 Crew B Remediation Package	July 2014
A1WEXLORBIENN1305T2	ANO-1 Biennial Written Exam RO Test 2	June 28, 2013
A1WEXLORBIENN1305T4	ANO-1 Biennial Written Exam RO Test 4	July 12, 2013
A1WEXLORBIENN1305T4R	ANO-1 Biennial Written Exam RO Test 4R	July 12, 2013
A1WEXLORBIENN1305T6R	ANO-1 Biennial Written Exam RO Test 6R	July 26, 2013
N/A	Unit 1 Licensed Operator 2012-2013 Requalification Cycle Report	August 2013
Unit 1 2014 AOT Simulator Scenarios	Weeks 1-6	July 2014
Unit 1 2014 AOT JPMs	Weeks 1-6	July 2014
Unit 1 2013 AOT Simulator Scenarios	Weeks 1-6	July 2013
Unit 1 2013 AOT JPMs	Weeks 1-6	July 2013

Condition Reports

CR-ANO-2012-00948	CR-ANO-C-2013-00556	CR-ANO-1-2013-03237
CR-ANO-C-2012-01834	CR-ANO-C-2013-02252	CR-ANO-C-2014-00022
CR-ANO-C-2012-01936	CR-ANO-C-2014-00377	CR-ANO-1-2014-01062
CR-ANO-C-2013-00234	CR-ANO-C-2014-00653	TEAR-ANO-2013-00656
CR-ANO-C-2013-00287	CR-ANO-C-2014-01864	TEAR-ANO-2014-00357

CR-ANO-C-2013-00529 CR-ANO-1-2013-02090

Section 1R12: Maintenance Effectiveness

Miscellaneous

Number	Title	Revision/Date
	Unit 2 EFW – Emergency/Auxiliary Feedwater Maintenance Rule Basis Document	
STM 1-05	Decay Heat Removal System	16
JO 00968863	Replace Prop Spring on Circuit Breaker, A-309, S/N 0224A4969	April 14, 1998
GE SAL 348.1	Prop Springs, ML-13, ML-13A Mechanisms, All 5kV, 7.2kV, and 13.8kV Type AM and VVC Breakers	December 7, 1990
GE SAL 351.1	Addition Prop Spring, ML-13, ML-13A Mechanisms, All 5kV, 7.2kV, and 13.8kV Type AM Magne-Blast Breakers	June 23, 1994

Condition Reports

CR-ANO-C-2001-0070 CR-ANO-1-2013-00701 CR-ANO-1-2013-00721

CR-ANO-1-2013-00752

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

Number	Title	Revision
COPD-024	Risk Assessment Guidelines	050
OP-2104.037	Alternate AC Diesel Generator Operations	028

Miscellaneous

Number	Title	Date
EN-FAP-OM-012, Attachment 7.4	Emergency Issues Checklist – AACG non-functional due to failure to transfer aux loads	September 14, 2014
EN-MA-125, Attachment 9.3	Troubleshooting Control of Maintenance Activities – AAC DG troubleshooting control form	September 14, 2014

Condition Report

CR-ANO-C-2014-02395

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

Number	Title	Revision
OP-1412.001	Preventative Maintenance of Limitorque SB/SMB Motor Operators	037
OP-1412.001	Preventative Maintenance of Limitorque SB/SMB Motor Operators	041
OP-5120.010	Unit 1 & Unit 2 MOV Testing	018
EN-OP-104	Operability Determination Process	7
SEP-ANO-2-IST-2	ANO Unit 2 Inservice Testing Plan	2
SEP-ANO-2-IST-1	ANO Unit 2 IST Bases Document	3
OP-2106.006	Emergency Feedwater System Operations	084
OP-2202.008	Station Blackout	012
OP-2202.006	Loss of Feedwater	011
OP-2202.003	Loss of Coolant Accident	014
OP-2202.004	Steam Generator Tube Rupture	014
OP-2202.005	Excess Steam Demand	014
OP-1903.069	Equipment Important to Emergency Preparedness	000
OP-1903.010	Emergency Action Level Classification	050

Drawing

Number	Title	Revision
M-2202, Sh. 4	Lube Oil, Lube Oil Cooling, Electro/Hydraulic Controls & Main Steam	20

Miscellaneous

Number	Title	Revision
EPLAN	Arkansas Nuclear One Emergency Plan	38
ODCM	Offsite Dose Calculation Manual	25
ER-ANO-2006-0389-000	U2 EFW Alignment to QCST Evaluation	0
CALC-05-E-0004-01	Minimum MU Tank Level vs. Pressure	0

Miscellaneous

Number	Title	Revision
EPLAN	Arkansas Nuclear One Emergency Plan	38
ODCM	Offsite Dose Calculation Manual	25
ULD-2-SYS-21	ANO-2 Main Steam System	
ER980655I201	Unit 2 EFW Steam Trap Modification	0

Condition Reports

CR-ANO-2-2014-01169	CR-ANO-2-2013-01729	CR-ANO-2-2014-02401
CR-ANO-C-2014-00855	CR-ANO-2-2014-00070	CR-ANO-2-2014-02420
CR-ANO-2-2014-02326	CR-ANO-2-2001-00029	CR-ANO-2-2014-02545

Section 1R17: Evaluations of Changes, Tests, or Experiments and Permanent Plant Modifications

Calculations

Number	Title	Revision
CALC-06-E-0002-01	ANO Offsite Power Requirement	1
CALC-11-E-0007-01	ANO-2 Startup #3 & Unit 2 Auxiliary Millstone Studies	0
CALC-12-E-00001-01	Evaluation of EDG Fuel Tank Vents for Tornado Missile Impact	0
CALC-12-E-00002-01	Evaluation of EDG Fuel Tank Vents for Tornado Missile Impact	0
CALC-6600-2-941	SW Piping to 2E20B and 2VE1B	5
CALC-87-E-0003-01	ANO-2 Auxiliary Building HELB Results with Door 253 Open	5
CALC-88-E-0200-15	P-T Calculation for Unit 2 Service Water System	3
CALC-92-E-0021-08	Class 1E 125 V DC Train 1 DC Voltage Drop	1
CALC-92-E-0021-09	Class 1E 125 V DC Train 2 DC Voltage Drop	1
CALC-92-E-01303-01	ANO-1 Switchgear, Battery, DC, and Corridor 98 HVAC Evaluation	5
CALC-CV-1400-05	Unit 1 - Seismic Qualification of Valve Assembly CV-1400.	2
CALC-CV-1401-05	Unit 1 – Seismic Qualification on Valve Assembly CV 1401	1

Condition Reports

CR-ANO-1-2003-000346	CR-ANO-1-2013-000515	CR-ANO-C-2007-000289
CR-ANO-C-2014-002068	CR-ANO-1-2010-003763	CR-ANO-1-2013 001217
CR-ANO-C-2011-000335	CR-ANO-C-2014-000932	CR-ANO-1-2010-003766

Condition Reports

CR-ANO-2-2011-002493	CR-ANO-C-2014-002067	CR-ANO-LBD-14-021
CR-ANO-1-2013-000495	CR-ANO-2-2014-000781	

Drawings

Number	Title	Revision
2HBC-64-1 Sh. 1	Large Pipe Isometric Service Water from Loop II Service Water Header to Emergency Diesel Jacket Cooler	19
2HBC-64-1 Sh. 2	Large Pipe Isometric Service Water from Loop II Service Water Header to Emergency Diesel Jacket Cooler	9
E-1 Sht. 1	Unit 1 Station Single Line Diagram	59
E-15 Sht. 1	Single Line Diagram 480 Volt Motor Control Centers B51 & B52	63
E-16 Sht. 1	Single Line Diagram 480 Volt Motor Control Centers B55 & B56	62
E-17 Sht. 1	Unit 1 Red Train Vital AC & 125 V DC Single Line & Distribution	48
E-17 Sht. 1A	Unit 1 Green Train Vital AC and 125 V DC Single Line & Distribution	13
E-18 Sht. 1	Single Line Diagram 480 Volt Motor Control Centers B61 B62	76
E-19 Sht. 1	Single Line Diagram 480 Volt Motor Control Centers B53 & B63	42
E-2001 Sht. 1	Unit 2 Station Single Line Diagram	37
E-2003 Sht. 1	Unit 2 Single Line Meter & Relay Diagram 6900 Volt System	21
E-2004 Sht. 1	Unit 2 Single Line Meter & Relay Diagram 4160 Volt System, Main Supply	19
E-2008 Sht. 1	Unit 2 Single Line Meter And Relay Diagram 480 Volt Load Centers Engineered Safeguard Features & Main Supply	30
E-2014 Sht. 1	Single Line Diagram 480 Volt Motor Control Center 2B51	53
E-2014 Sht. 2	Single Line Diagram 480 Volt Motor Control Center 2B52	42
E-2014 Sht. 3	Single Line Diagram 480 Volt Motor Control Center 2B53	38
E-2014 Sht. 4	Single Line Diagram 480 Volt Motor Control Center 2B54	47
E-2015 Sht. 1	Single Line Diagram 480 Volt Motor Control Center 2B61	47
E-2015 Sht. 2	Single Line Diagram 480 Volt Motor Control Center 2B62	41
E-2015 Sht. 3	Single Line Diagram 480 Volt Motor Control Center 2B63	38
E-2015 Sht. 4	Single Line Diagram 480 Volt Motor Control Center 2B64	46
E-2017 Sht. 1A	Unit 1 Green Train Vital AC & 125 V DC Single Line & Distribution	10
E-2017 Sht. 1B	Unit 1 Red Train Vital AC & 125 V DC Single Line & Distribution	8

Drawings

Number	Title	Revision
E-3 Sht. 1	Unit 1 Single Line Meter & Relay Diagram 6900 Volt System	23
E-4 Sht. 1	Unit 1 Single Line Meter & Relay Diagram 4160 Volt System, Main Supply	29
E-8 Sht. 1	Unit 1 Single Line Meter And Relay Diagram 480 Volt Load Centers Engineered Safeguard Features & Main Supply	26
FSK-M-1048 Sh.2	Tubing Installation Details Decay Heat Removal Modification Valve CV-1401 Bonnet Leakoff	0
M-2210 Sh. 1	Unit 2 Piping and Instrument Diagram, Service Water System	86

50.59 Evaluations

Number	Title	Revision
11-001	Condition Report CR-ANO-1-2011-2533, "SW-9 Operability Evaluation"	0
12-001	Engineering Change EC-34309, "Revised ECP Temperature/Inventory Analysis and EDG Capacity Ratings"	0
13-001	Engineering Change EC-41466, "Modification of Electrical Equipment Room Exhaust Fans"	0
13-002	Engineering Change EC 43686 “Install Temporary Offsite Power to ES Bus A3 and/or A4”	1
13-002R1	R1Engineering Change EC-43686, "Install Temporary Offsite Power to ES Bus A3 and/or A4"	0
13-003	Engineering Change EC-44208, "OTSG Tube Preload Determination"	0
13-004	Engineering Change EC-43758, Unit 1, Install Temporary Offsite Power to ES Bus A3/A4 from SU2	0
13-005	Engineering Change EC-42989, "Evaluation of the Dose Impact of an Increase in the Post LOCA ESF Leakage"	0
13-005 R1	Engineering Change EC-42989, "Evaluation of the Dose Impact of an Increase in the Post LOCA ESF Leakage"	0
13-006	Work Plan 1408.778 “Main Generator Stator Ventilation Testing”	0
13-007	Engineering Change EC-45808 “EC Markup for CALC-92-E-0103-01 to Update Room 104 Free Convection Model & Determine New Operator Actions”	0
13-008	Engineering Change EC-45769, "Contingency Use of a New Overhead Hoist with Existing Refueling Tool to Move Fuel to Row B-B"	0
14-001	Engineering Change EC-37543, "LOCA Dose Analysis Update"	0

50.59 Evaluations

Number	Title	Revision
14-002	Engineering Change EC-49799, "RCP 2P-32C Axial Position Indication T-Mod"	0

Modifications

Number	Title	Revision
EC-0000030777	Weld Overlay Repair Of 2HBC-64-8" Pipe. Code Case N 661-1	1
EC-0000031283	Ano-1 MFWP Servo Enclosure Vortex Cooler Tubing	0
EC-0000032588	Installation Of SW Return Isolation Valve For SW Boundary Check Valve SW-9. New Valves SW-23 & SW 1002	0
EC-0000033422	Replace Battery Room Exhaust Fans Installed by EC 17162	0
EC-0000033517	Engineering Evaluation To Document Acceptability Of Air Entering The Operating Charging Pump, Either 2P-36A/B/C, as Result Of Post-maintenance Fill & Vent Of Non-Operating 2P-36A/B/C	0
EC-0000034016	Breaker Change	0
EC-0000038258	SI Tank High Point Vent Piping Material Reconciliation. Class I - Class II Break	0
EC-0000039238	Effects Of Site Maximum Ambient Of 113 F On ANO-1 EDG Combustion Air And Possible Derating	0
EC-0000041466	Alternate Forced Ventilation System For ANO-1 Battery, DC & Switchgear Areas when VCH-4A/B Is Out-Of-Service - Short Term Modifications	0
EC-0000041948	CV-1401 Modification To Resolve Pressure Locking Concern	0
EC-0000042277	2X-02 Unit Auxiliary Breaker Replacement	0
EC-0000043788	Revise the Diesel Generator Breaker Setting	0
EC-0000045122	Correct Body-Bonnet Stud Size On DH/LPI Block Valve CR-ANO-1-2013-01217 CA-03 Resolution	0
EC-0000046026	1R24 Evaluate Leak On DH-17 For Boric Acid Per EN-DC-319	0
EC-0000048670	Replace 2HPS-36/38 With Velan Valve Cat Id 0032040211	0
EC-0000050342	Add Detail For Installation Of Flood Barrier In Conduits Entering Junction Box 2JB300 (Ref. CR-ANO-C-2014-0932)	0

Procedures

Number	Title	Revision
1104.027	Battery and Switchgear Emergency Cooling System	23

Procedures

Number	Title	Revision
1104.027	Battery and Switchgear Emergency Cooling System	25
1104-027	Battery and Switchgear Emergency Cooling System	43
1104-027	Battery and Switchgear Emergency Cooling System	46
1107.001	Electrical System Operations	104
1202.007	Degraded Power	11
2107.001	Electrical System Operations	109
CEP-NDE-0505	Ultrasonic Thickness Examination	4
EN-DC-112	Engineering Change Request and Project Initiation Process	7
EN-DC-115	Engineering Change Process	16
EN-DC-132	Control of Engineering Documents	6
EN-DC-134	Design Verification	5
EN-DC-141	Design Inputs	14
EN-LI-100	Process Applicability Determination	15
EN-LI-101	10 CFR 50.59 Evaluations	12

50.59 Screens

Number	Title	Revision
EC-0000029633	Unit 1 DC Voltage Drop Calculation Revisions	0
EC-0000030476	Change Setpoints on Hottest Spot Winding Temperature Indicators TIS-9602C, TIS-9606C (X-01C), & TIS-9602D (X-01S) to those Documented in TMOD EC-26449 (X-01C) and TMOD EC 25817 (X-01S)	0
EC-0000030672	Evaluation Of ASME Section III Analysis For ANO-2 Hot Leg Drain Nozzle Weld Overlay Due To Non-Conservative Analysis Results During Original Analysis	0
EC-0000030777	Weld Overlay Repair Of 2HBC-64-8" Pipe, ~10.75" East Of FW-47, Shown On 2HBC-64-1. CR-ANO-2-2011-2493. WR243008. WO284847. Code Case N-661-1. MIC Pipe Flaw. Rev 1 - Add Section XI Review	0
EC-0000032588	Installation Of SW Return Isolation Valve For SW Boundary Check Valve SW-9. New Valves SW-23 & SW-1002	0
EC-0000033332	ANO-1 Cycle 24 Increased Quadrant Power Tilt	0
EC-0000034703	ANO Units 1 & 2 Tornado Missile Evaluation of EDG Fuel Tank Vents	0
EC-0000038258	SI Tank High Point Piping Material Reconciliation (Class 1-Class 2 Break)	0

50.59 Screens

Number	Title	Revision
EC-0000038965	Evaluation Of Allowable Void In DH/LPI Injection Piping. Per CR-ANO-1-2012-01065, DH-17 Back leakage Requires Evaluation To increase Allowable Void Above Current 0.175 Ft^3 Limit	0
EC-0000039701	Replace ECP Supply Sluice Gate 2CV-1473-5 And Change MOV Setpoint Calc To Increase Required Torque/Thrust For New Machined Gate	0
EC-0000041883	ANO-2 Auxiliary Building HELB Results with Door 253 Open	0
EC-0000043530	Alternate Internal Location For Vortex Breaker Around 2IS 4031 & 2IS-4031 In Secondary Sampling Isothermal Bath 2E-073. Reference EC-23895 Parent EC	0
EC-0000043788	Revise Diesel Generator Breaker Setting	0
EC-0000048200	Disconnect Unit Auxiliary Transformer 2X-02 & Operate Unit 2 with Auxiliary Loads Supplied from Startup Transformer 2X-03	0
EC-0000048670	Replace 2HPSI-36/38 With Velan Valve Cat. ID 0032040211	0
EC-0000050312	ECN To Waive Target Rock Valve Bench Testing Requirement For 2SV-4668-1, 2SV-4668-2, 2SV-4670-2, and 2SV-5024. Reference EC 44037	0
EC-0000050342	Add Detail for Installation of Flood Barrier in Conduits Junction Box 2JB300	0
EC-0000120468	ANO-1 EFW Steam Admission Valve Replacement	0
EOP-1202.010 R20	Standard Attachments – Revised Voltage Requirements for Offsite Power Operability Based on ANO-2 Startup Transformer #3 and Unit Auxiliary Millstone Studies	20

Work Orders

00284670	00284675	00284677	00374863	00284673
00284676				

Miscellaneous Documents

Number	Title	Revision/Date
N-661-1	ASME Code Case N-661-01 “Alternative Requirements for Wall Thickness Restoration of Class 2 and 3 Carbon Steel Piping for Raw Water Service” Section XI, Division 1	October 11, 2005
ULD-2-SYS-10	ANO Unit 2 Service Water System	11
2-BOP-UT-11-031	NDE Report: Unit 2 RAB 354 foot Vacuum DeGas	0

Miscellaneous Documents

Number	Title	Revision/Date
Regulatory Guide 1.147	Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1	16
Generic Letter 90-05	Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping	June 15, 1990
ANO-M-2555	Unit 2 Piping Specification Sheets	1
1203-025	Natural Emergencies	49
2203-008	Natural Emergencies	31

Section 1R19: Post-Maintenance Testing

Procedures

Number	Title	Revision
OP-1412.187	HPL-C Transfer Switch Inspection & Lubrication	004
EN-MA-125	Troubleshooting Control of Maintenance Activities	17
OP-6030.110	Termination, Splicing, & Soldering of Cable & Wire	017
OP-1104.002	Makeup & Purification System Operation	083
OP-1104.029	Service Water & Auxiliary Cooling System	106

Drawing

Number	Title	Revision
M-231, Sh. 1	Makeup & Purification System	113

Work Orders

00388099-01 0070036 00084546 389210-12

Condition Reports

CR-ANO-1-2014-01149 CR-ANO-1-2014-01121 CR-ANO-1-2014-01129

CR-ANO-1-2014-01523 CR-ANO-1-2014-01520

Section 1R22: Surveillance Testing

Procedures

Number	Title	Revision
OP-2302.009	Moderator Temperature Coefficient at Power	029
COPD-030	Reactivity Management Program	007
OP-1607.015	Sampling the Core Flood Tanks (T-2A/B)	010

Procedures

Number	Title	Revision
OP-1042.003	Radiochemistry Routing Surveillance Schedule and Tech. Spec. Reporting	033
OP-1104.001	Core Flood System Operating Procedure	057
OP-2305.026	Reg Guide 1.97 Instrument Verification	021
OP-1104.036	Emergency Diesel Generator Operation	068
OP-1103.013	RCS Leak Detection	040
OP-2305.002	Reactor Coolant System Leak Detection	024

Miscellaneous

Title	Date
Unit 1 RCS Leak Rate Calculation	August 22, 2014
Unit 2 RCS Leak Rate Report	August 21, 2014

Work Orders

52446203 52509214 52509219

Condition Report

CR-ANO-1-2014-00426

Section 1EP6: Drill Evaluation

Procedure

Number	Title	Revision
SES-1-CPE	Unit 1 Crew Performance Evaluation Scenario	1

Section 4OA1: Performance Indicator Verification

Procedures

Number	Title	Revision
EN-LI-114	Performance Indicator Process	006
ECH-NE-09-00041	ANO1 MSPI Bases Document	1
ANO2-SA-06-00001	ANO-2 MSPI Basis Document	2

Miscellaneous

Number	Title
EN-LI-114, Attachment 9.2	3rd Quarter 2013, Emergency AC Power NRC Performance Indicator Technique/Data Sheet
EN-LI-114, Attachment 9.2	4th Quarter 2013 Emergency AC Power NRC Performance Indicator Technique/Data Sheet
EN-LI-114, Attachment 9.2	1st Quarter 2014 Emergency AC Power NRC Performance Indicator Technique/Data Sheet
EN-LI-114, Attachment 9.2	2nd Quarter 2014 Emergency AC Power NRC Performance Indicator Technique/Data Sheet

Condition Report

CR-ANO-2-2014-1403

Section 4OA2: Problem Identification and Resolution

Procedures

Number	Title	Revision
OP-1015.021	ANO-2 EOP/AOP User Guide	012
OP-2203.034	Fire or Explosion	015
OP-2203.051	Internal Flooding	002
OP-2203.017	Moderator Dilution	007

Condition Report

CR-ANO-C2014-02049

Section 4OA3: Follow-up of Events and Notices of Enforcement Discretion

Procedures

Number	Title	Revision
OP-2102.004	Power Operation	056
	491 EFPD 1 hour Shutdown Contingency Plan	0

Condition Report

CR-ANO-C-2014-1142

ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Ryan E. Lantz, Chief
Project Branch E
Division of Reactor Projects

Docket Nos.: 50-313, 50-368
License Nos.: DRP-51; NPF-6

Enclosure:
Inspection Report 05000313/2014004 and
5000368/2014004 w/Attachment

cc w/encl:
Electronic Distribution for Arkansas Nuclear One

DISTRIBUTION:
See next page

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☑ SUNSI Review By: REL		ADAMS ☑ Yes ☐ No	☑ Publicly Available ☐ Non-Publicly Available		☑ Non-Sensitive ☐ Sensitive		Keyword: NRC-002
OFFICE	SRI:DRP/E	RI:DRP/E	PE:DRP/E	C:DRS/EB1	C:DRS/EB2	C:DRS/OB	C:DRS/PSB1
NAME	BTindell/PBH	MYoung	JMelfi	TFarnholtz	GWerner	VGaddy	MHaire
SIGNATURE	/RA/E	/RA/E	/RA/E	/RA/	/RA/TRF for	/RA/JCK for	/RA/
DATE	10/29/14	10/21/14	11/9/14	10/02/14	10/23/14	10/23/14	10/23/14
OFFICE	C:DRS/PSB2	C:DRS/TSB	SPE:DRP/E	BC:DRP/E			
NAME	HGepford	GMiller	CYoung	RLantz			
SIGNATURE	/RA/	/RA/	/RA/	/RA/			
DATE	10/23/14	10/22/14	11/07/14	11/10/14			

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Letter to Jeremy Browning from Ryan E. Lantz dated November 12, 2014

SUBJECT: ARKANSAS NUCLEAR ONE – NRC INTEGRATED INSPECTION REPORT 05000313/2014004 AND 05000368/2014004

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