



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION IV
1600 EAST LAMAR BOULEVARD
ARLINGTON, TEXAS 76011-4511

May 09, 2023

Joseph Sullivan
Site Vice President
Entergy Operations, Inc.
Arkansas Nuclear One
N-TSB-58
1448 S.R. 333
Russellville, AR 72802-0967

**SUBJECT: ARKANSAS NUCLEAR ONE – INTEGRATED INSPECTION
REPORT 05000313/2023001 AND 05000368/2023001**

Dear Joseph Sullivan:

On March 31, 2023, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Arkansas Nuclear One. On April 6, 2023, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

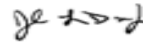
Two findings of very low safety significance (Green) are documented in this report. One of these findings involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with section 2.3.2 of the Enforcement Policy.

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

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

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

Sincerely,



Signed by Dixon, John
on 05/09/23

John L. Dixon, Jr., Chief
Projects Branch D
Division of Operating Reactor Safety

Docket Nos. 05000313 and 05000368
License Nos. DPR-51 and NPF-6

Enclosure:
As stated

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Numbers: 05000313 and 05000368

License Numbers: DPR-51 and NPF-6

Report Numbers: 05000313/2023001 and 05000368/2023001

Enterprise Identifier: I-2023-001-0007

Licensee: Entergy Operations, Inc.

Facility: Arkansas Nuclear One

Location: Russellville, AR

Inspection Dates: January 1, 2023, to March 31, 2023

Inspectors: N. Brown, Resident Inspector
R. Bywater, Senior Resident Inspector
T. DeBey, Resident Inspector

Approved By: John L. Dixon, Jr, Chief
Projects Branch D
Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting an integrated inspection at Arkansas Nuclear One, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC’s program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

Failure to Properly Establish and Implement Maintenance Procedure for Work on Unit 2, Loop D High-Pressure Safety Injection Valve			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000368/2023001-01 Open/Closed	[H.5] - Work Management	71111.12
<p>The inspectors identified a Green finding and associated non-cited violation of Arkansas Nuclear One, Unit 2, technical specification 6.4.1.a, when the licensee failed to adequately establish and perform maintenance procedures appropriate to the circumstances, as recommended in Regulatory Guide 1.33, revision 2, appendix A, section 9.a. Specifically, the licensee’s Procedure EN-MA-141, “Limitorque Valve Operator Model SMB/SB/SBD-000 Through 5 MOV and HBC Periodic Inspection,” revision 21, did not establish sufficient detail, nor was it appropriately implemented, to provide assurance that the valve operator would function as designed after maintenance.</p>			

Unit 1 Reactor Trip Caused by Main Feedwater Pump Transient			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000313/2023001-02 Open/Closed	None (NPP)	71153
<p>A self-revealed Green finding was identified when the licensee failed to enter the correct programmable parameters for the Unit 1 main feedwater pump turbine high-pressure governor control system during maintenance activities in 2015. On November 29, 2021, following the failure of the main feedwater pump A low-pressure governor servo drive and actuator, the high-pressure governor was unable to respond to lowering main feedwater pump speed because of the incorrect programmable parameters. The corresponding reduction in main feedwater flow resulted in an automatic reactor trip due to high reactor coolant system pressure.</p>			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000313/2021-002-00	Automatic Reactor Trip Due to High Reactor Coolant System Pressure	71153	Closed

PLANT STATUS

Unit 1 began the inspection period at approximately 40 percent and increasing, following startup from refueling outage 1R30. The unit operated at full power from January 2, 2023, until February 14, 2023, when Unit 1 operators began a planned power reduction to 85 percent to complete replacement of the reactor coolant pump D underpower relay. During the maintenance activity, Unit 1 tripped when power was lost to reactor coolant pumps B and D. On February 16, 2023, after corrective maintenance and testing, Unit 1 operators restarted the reactor and returned the unit to full power. On March 2, 2023, Unit 1 operators reduced power to approximately 70 percent to replace a heater drain system level controller. The unit was returned to full power the same day and continued operating at full power for the remainder of the inspection period.

Unit 2 began the inspection period at full power. On January 5, 2023, Unit 2 operators reduced power to approximately 85 percent to address indications of condenser tube leakage. On January 7, 2023, Unit 2 operators reduced power further to approximately 76 percent to maintain condenser backpressure within limits. After completing condenser repairs, operators returned the unit to full power on January 8, 2023. The unit remained at full power until operators initiated an end-of-operating cycle power coast down on March 19, 2023. Unit 2 was operating at approximately 88 percent power at the end of the inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed activities described in IMC 2515, Appendix D, "Plant Status," observed risk-significant activities, and completed on-site portions of IPs. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Impending Severe Weather Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from impending severe weather during a wind advisory and thunderstorm warning on February 22, 2023.

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Unit 2 emergency diesel generator train B, after recent lightning strikes in area, on January 11, 2023
- (2) Unit 2 125 Vdc vital power, after concerns of battery condition and inverter alignment, on January 22, 2023
- (3) Unit 2 high-pressure safety injection train A, during injection valve train B testing on March 20, 2023
- (4) Unit 2 emergency feedwater train A, during spring severe weather season, on March 20, 2023

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

- (1) Unit 2 intake structure, fire zones 2010 and 2035, on January 16, 2023
- (2) Unit 2 underground diesel fuel storage vaults, fire zone 1030, on January 16, 2023
- (3) Unit 2 vital switchgear 2A4 room, fire zone 2100-Z, on February 6, 2023
- (4) Unit 2 turbine building, fire zone 2200-MM, on February 23, 2023
- (5) Unit 1 and Unit 2 hydrogen and carbon dioxide storage building, fire zone 3020, on February 27, 2023

Fire Brigade Drill Performance Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the onsite fire brigade training and performance during an unannounced Unit 1 lube oil storage tank room fire drill, fire area B-1, fire zone 187-DD, on January 23, 2023.

71111.06 - Flood Protection Measures

Flooding Sample (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated external flooding mitigation protection in the Unit 1 and Unit 2 emergency diesel fuel storage vaults on March 2, 2023.

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (2 Samples)

- (1) The inspectors observed and evaluated licensed operator performance in the control room during a Unit 2 power reduction to perform main condenser repairs on January 5, 2023.
- (2) The inspectors observed and evaluated licensed operator performance in the control room during a Unit 1 power reduction to replace the reactor coolant pump D underpower relay on February 14, 2023.

Licensed Operator Requalification Training/Examinations (IP Section 03.02) (2 Samples)

- (1) The inspectors observed and evaluated a Unit 2 simulator scenario of a reactor coolant pump seal leak, loss of feed, and failure to manually trip the reactor on January 26, 2023.
- (2) The inspectors observed and evaluated a Unit 1 simulator scenario of a steam generator tube rupture and reactor coolant system natural circulation cooldown on February 16, 2023.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (2 Samples)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

- (1) Unit 2 high-pressure safety injection motor-operated valve 2CV-5036-2 maintenance after testing failure on January 25, 2023
- (2) Unit 1 and Unit 2 calibration of radiation monitors using the JL Shepherd calibrator after reviewing history of calibration issues on March 24, 2023

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (3 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

- (1) Units 1 and 2 elevated risk due to concurrent outages of the diesel-driven fire pump and common feedwater flow paths to Unit 1 steam generator B and Unit 2 steam generator B, on January 4, 2023
- (2) Unit 2 risk assessment, required by technical specification 4.0.3, following discovery that trip circuit breakers had not been tested within the required surveillance interval, on January 19, 2023
- (3) Unit 1 elevated risk for replacement of the reactor coolant pump D underpower relay, on February 21, 2023

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (8 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

- (1) Unit 1 service water pump A operability after replacement of motor on February 3, 2023
- (2) Unit 1 steam generator B operability after thermal cycling event during forced shutdown on February 14, 2023
- (3) Unit 1 inadequate core cooling monitor display system reactor vessel head fluid temperature after signal failure on February 21, 2023

- (4) Unit 1 service water pump B operability after failure of fire water jockey pump column support bracket on February 22, 2023
- (5) Unit 1 control room emergency air conditioning following questions about structural integrity on March 23, 2023
- (6) Unit 1 reactor building high range radiation monitors following questions (see CR-ANO-C-2023-00846) about calibration and alarm functions on March 24, 2023
- (7) Unit 2 containment high range radiation monitors following questions (see CRs: ANO-C-2023-00853 and 00864) about calibrations and alarm functions on March 24, 2023
- (8) Unit 1 super particulate, iodine, and noble gas monitor 4 functionality after corrective maintenance on March 28, 2023

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

- (1) temporary modification of relay trip circuit after failure of Unit 1 reactor coolant pump D underpower relay on February 23, 2023

71111.24 - Testing and Maintenance of Equipment Important to Risk

The inspectors evaluated the following testing and maintenance activities to verify system operability and/or functionality:

Post-Maintenance Testing (PMT) (IP Section 03.01) (1 Sample)

- (1) Unit 1 CV-2806 service water supply to turbine driven emergency feedwater pump valve post maintenance test on February 15, 2023

Surveillance Testing (IP Section 03.01) (3 Samples)

- (1) Unit 2 emergency diesel generator A on January 6, 2023
- (2) Unit 2 trip circuit breakers on January 26, 2023
- (3) Unit 1 125Vdc vital system on February 8, 2023

Inservice Testing (IST) (IP Section 03.01) (1 Sample)

- (1) Unit 2 high-pressure safety injection train A quarterly valve stroke test on March 21, 2023

Reactor Coolant System Leakage Detection Testing (IP Section 03.01) (1 Sample)

- (1) Unit 2 evaluation of elevated reactor coolant system unidentified leakage on February 24, 2023

71114.06 - Drill Evaluation

Select Emergency Preparedness Drills and/or Training for Observation (IP Section 03.01)
(1 Sample)

- (1) The Green emergency response organization team emergency preparedness site integrated drill on March 7, 2023.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

IE01: Unplanned Scrams per 7000 Critical Hours Sample (IP Section 02.01) (2 Samples)

- (1) Unit 1 (January 1, 2022, through December 31, 2022)
- (2) Unit 2 (January 1, 2022, through December 31, 2022)

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02)
(2 Samples)

- (1) Unit 1 (January 1, 2022, through December 31, 2022)
- (2) Unit 2 (January 1, 2022, through December 31, 2022)

IE04: Unplanned Scrams with Complications (USwC) Sample (IP Section 02.03) (2 Samples)

- (1) Unit 1 (January 1, 2022, through December 31, 2022)
- (2) Unit 2 (January 1, 2022, through December 31, 2022)

71153 - Follow Up of Events and Notices of Enforcement Discretion

Event Report (IP section 03.02) (1 Sample)

The inspectors evaluated the following licensee event reports (LERs):

- (1) LER 05000313/2021-002-00, "Automatic Reactor Trip Due to High Reactor Coolant System Pressure" (ML22027A731). The inspection conclusions associated with this LER and an associated finding are documented in the Inspection Results section of this report.

Personnel Performance (IP section 03.03) (2 Samples)

- (1) The inspectors evaluated the licensee's performance to reduce Unit 2 power during condenser water box maintenance from 85 percent power to 76 percent power, in response to increasing condenser backpressure, on January 7, 2023.
- (2) The inspectors evaluated the licensee's performance for the Unit 1 trip during replacement of reactor coolant pump D underpower relay on February 14, 2023.

INSPECTION RESULTS

Failure to Properly Establish and Implement Maintenance Procedure for Work on Unit 2, Loop D High-Pressure Safety Injection Valve			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000368/2023001-01 Open/Closed	[H.5] - Work Management	71111.12
<p>The inspectors identified a Green finding and associated non-cited violation of Arkansas Nuclear One, Unit 2, technical specification 6.4.1.a, when the licensee failed to adequately establish and perform maintenance procedures appropriate to the circumstances, as recommended in Regulatory Guide 1.33, revision 2, appendix A, section 9.a. Specifically, the licensee's Procedure EN-MA-141, "Limitorque Valve Operator Model SMB/SB/SBD-000 Through 5 MOV and HBC Periodic Inspection," revision 21, did not establish sufficient detail, nor was it appropriately implemented, to provide assurance that the valve operator would function as designed after maintenance.</p> <p><u>Description:</u> On January 18, 2023, the licensee implemented work order 52978662, to complete major preventive maintenance on the loop D, high-pressure safety injection, motor-operated valve 2CV-5036-2, using Procedure EN-MA-141, "Limitorque Valve Operator Model SMB/SB/SBD-000 Through 5 MOV and HBC Periodic Inspection." This maintenance included visual inspection, cleaning, lubrication, mechanical component examination, actuator intrusive examination, grease examination, actuator electrical examination, torque switch examination, limit switch examination, motor examination, fastener torquing, and packing inspection/adjustment. In order to comply with containment integrity TS requirements, the maintenance was required to be performed with the valve de-energized and locked in the closed position. With the valve locked in the closed position, the "close" torque switch contacts were open and not able to be tested to ensure that the contact resistance was <1 ohm. The procedure did not have a location for documenting the lack of contact resistance testing, so it was not documented. The technicians performing the work knew that they had not performed the required resistance check, and they also knew that it was impossible to perform while the valve was locked in the closed position. Following completion of the work order, the post-maintenance test failed due to high resistance in the "close" torque switch and the valve was declared inoperable. Troubleshooting identified a high-resistance torque switch contact as the cause of the failure, which was corrected, and the valve was declared operable.</p> <p>The inspectors reviewed completed work order documentation, which stated, "Torque Switch Contacts Clean and less than 1 Ohm." The procedure did not have sufficient detail to capture the examination or documentation of multiple torque switches. The procedure also did not have sufficient detail to indicate whether the valve should be open/closed/mid-position, or if the valve position needed to be changed to perform the maintenance correctly and completely. Further, the procedure did not direct technicians to insulate torque switch contacts when testing the limit switch continuity. Failure to insulate the contacts could lead to false measurements for the limit switch contacts. The workers did not document the limitations of the procedure, or seek resolution from their supervisor, when it was known that the resistance measurements of both sets of contacts could not be made without changing the valve position. Since procedure EN-MA-141 is an Entergy fleet procedure, these weaknesses could affect the operability of many motor-operated valves across the fleet.</p>			

Corrective Actions: The licensee initiated corrective actions to repair the valve when it failed its post-maintenance test and to improve procedure EN-MA-141.

Corrective Action References: The licensee entered this issue into their corrective action program as condition reports CR-ANO-2-2023-00108 and CR-ANO-C-2023-00387.

Performance Assessment:

Performance Deficiency: The failure to establish and perform procedures, appropriate to the circumstances, for maintenance that could affect the performance of safety-related equipment is a performance deficiency. Specifically, procedure EN-MA-141, which is used for preventive maintenance on safety-related, motor-operated valves, did not contain enough detail to ensure that the valve operators would perform as required to accomplish their required safety functions.

Screening: The inspectors determined 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. Specifically, the inadequate procedure resulted in a failed post-maintenance test and inoperability of high-pressure safety injection valve 2CV-5036-2.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." In accordance with section A of IMC 0609, appendix A, Exhibit 2, "Mitigating Systems Screening Questions," issued November 30, 2020, the finding is of Green significance because the finding did not represent a deficiency affecting design or qualification of a mitigating structure, system, or component; did not involve a single-train TS system; did not represent the loss of probabilistic risk assessment (PRA) function one train of a multi-train system for greater than its TS allowed outage time; did not represent the loss of PRA function of two separate TS systems for greater than 24 hours; did not represent the loss of a PRA system and/or function as defined in the PRIB or the licensee's PRA for greater than 24 hours; and, did not represent the loss of the PRA function of one or more non-TS trains of equipment designated as risk-significant in accordance with the licensee's maintenance rule program for greater than 3 days. Additionally, the finding did not involve external events mitigating systems, the reactor protection system, fire brigade, or flexible coping strategies.

Cross-Cutting Aspect: H.5 - Work Management: The organization implements a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. The work process includes the identification and management of risk commensurate to the work and the need for coordination with different groups or job activities. The inspectors determined that the most significant contributing cause of this performance deficiency was failure of the ANO maintenance department to coordinate the valve work with the ANO operations department such that nuclear safety was the overriding priority.

Enforcement:

Violation: Technical specification (TS) 6.4.1.a for Unit 2 requires, in part, that written procedures be established, implemented, and maintained covering the applicable areas listed in appendix A to Regulatory Guide 1.33, "Quality Assurance Program Requirements," revision 2, dated February 1978. Regulatory Guide 1.33, appendix A, section 9.a, states, in part, that maintenance that can affect the performance of safety-related equipment should be

properly preplanned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances.

Contrary to the above, prior to January 18, 2023, the licensee failed to establish and perform procedures, appropriate to the circumstances, for maintenance that could affect the performance of safety-related equipment. Specifically, the licensee failed to provide appropriate written instructions appropriate to the circumstances in Procedure EN-MA-141, "Limitorque Valve Operator Model SMB/SB/SBD-000 Through 5 MOV and HBC Periodic Inspection," to adequately evaluate all torque switches.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with section 2.3.2 of the Enforcement Policy.

Unit 1 Reactor Trip Caused by Main Feedwater Pump Transient

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000313/2023001-02 Open/Closed	None (NPP)	71153

A self-revealed Green finding was identified when the licensee failed to enter the correct programmable parameters for the Unit 1 main feedwater pump turbine high-pressure governor control system during maintenance activities in 2015. On November 29, 2021, following the failure of the main feedwater pump A low-pressure governor servo drive and actuator, the high-pressure governor was unable to respond to lowering main feedwater pump speed because of the incorrect programmable parameters. The corresponding reduction in main feedwater flow resulted in an automatic reactor trip due to high reactor coolant system pressure.

Description: On November 29, 2021, while operating at 100 percent power, the Unit 1 main feedwater pump A low-pressure governor servo drive and actuator failed, resulting in closure of the governor valve and decreasing pump speed. Under normal conditions, the high-pressure governor control system would compensate and return pump speed to normal. However, the high-pressure governor control system did not open the governor valve quickly enough to respond to demanded pump speed. Operators noted the decrease in pump speed and flow and manually tripped main feedwater pump A to initiate a plant runback, but not before the underfeed condition to steam generator A caused an increase in reactor coolant system pressure and an automatic reactor trip. The post-trip response was normal, with main feedwater pump B providing feedwater flow to both steam generators for reactor coolant system heat removal.

Following the event, the licensee replaced the failed low-pressure governor servo drive and actuator and performed troubleshooting activities to determine why the high-pressure governor control system did not function correctly. The licensee determined that programmable input parameters for the high-pressure governor controller were not correct. The licensee extent of condition identified that the main feedwater pump B controller also had incorrect parameter values. The main feedwater pump B functioned properly because there was no problem with its low-pressure governor servo drive and actuator.

Further investigation into the cause of having the incorrect programmable parameters identified that maintenance performed in 2015 to complete a system upgrade, in accordance with engineering change EC-51175, required instrumentation and control technicians to use

programmable parameters documented in calculation CALC-ANO-IC-10-0016. The licensee determined that these programmable parameters documented in the calculation were not correct. The reason the parameters were not correct was that the licensee failed to update calculation CALC-ANO-IC-10-0016 following completion of maintenance in 2011. The 2011 maintenance, completed in accordance with engineering change EC-8518, included determination of correct parameters through engineering change testing. Following completion of engineering change EC-8518, calculation CALC-ANO-IC-10-0016 was not updated with the correct programmable parameters for reference in future maintenance tasks. Therefore, engineering change EC-51175 was implemented in 2015 without the correct parameters that should have been documented in calculation CALC-ANO-IC-10-0016 following the maintenance completed in 2011.

Corrective Actions: The licensee implemented corrective actions to review and update procedures and work instructions to ensure main feedwater programmable parameters were correct.

Corrective Action References: The licensee entered these issues into the corrective action program with condition reports CR-ANO-1-2021-03129 and CR-ANO-1-2023-00603.

Performance Assessment:

Performance Deficiency: The inspectors determined the failure to install the correct programmable parameters into the main feedwater pump turbine control system in 2015, in accordance with engineering change EC-51175, was a performance deficiency. Specifically, the failure to update the source document for the programmable parameters (calculation CALC-ANO-IC-10-0016) when new parameters were determined by testing following a system upgrade in 2011. With incorrect programmable parameters, the main feedwater pump A, high-pressure governor was not able to respond correctly to a failure of the low-pressure servo drive and actuator. This led to reduction in main feedwater pump A flow and an automatic reactor trip on high reactor coolant system pressure.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Design Control attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, failure to control design documentation of the programmable parameters for the main feedwater turbine control system resulted in the incorrect parameters being installed, causing inability of the main feedwater pump to respond to another equipment failure. This led to an automatic reactor trip.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." In accordance with section B, IMC 0609, Appendix A, Exhibit 1, "Initiating Events Screening Questions," this transient initiator finding is Green in significance because although the finding caused a loss of main feedwater pump A, and a reactor trip, the finding did not cause a loss of feedwater because main feedwater pump B ran satisfactorily. The finding did not involve a loss of coolant accident initiator, support system initiator, steam generator tube rupture, or external event initiator. Additionally, because feedwater is also a mitigating system, the inspectors assessed the significance of the finding using Exhibit 2, "Mitigating Systems Screening Questions." The inspectors concluded the finding did not represent a loss of PRA functionality of the main feedwater pumps, nor did the finding involve external event mitigating systems, the reactor protection system, fire brigade, or flexible coping strategies.

Cross-Cutting Aspect: Not Present Performance. No cross-cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement: Inspectors did not identify a violation of regulatory requirements associated with this finding.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On April 6, 2023, the inspectors presented the integrated inspection results to Joseph Sullivan, Site Vice President, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Procedures	EN-FAP-EP-010	Severe Weather Response	9
71111.01	Procedures	OP-1203.025	Natural Emergencies	80
71111.04	Corrective Action Documents	CR-ANO-	2-2022-00423, 2-2022-00834, 2-2022-00838, 2-2022-00953, 2-2022-01630, 2-2022-01642, 2-2022-01648, 2-2022-01716, 2-2022-01717, 2-2022-01721, 2-2022-01872, 2-2022-02139, 2-2022-02241, 2-2022-02304, 2-2022-02305	
71111.04	Drawings	M-2204, Sheet 4	Emergency Feedwater	73
71111.04	Drawings	M-2232	High-Pressure Safety Injection	3
71111.04	Miscellaneous	ULD-2-SYS-03	ANO-2 125 Volt DC System	7
71111.04	Procedures	OP-2104.036	Emergency Diesel Generator Operations	104
71111.04	Procedures	OP-2104.039	HPSI System Operation	94
71111.04	Procedures	OP-2106.006	Emergency Feedwater System Operations	110
71111.04	Procedures	OP-2107.004	DC Electrical System Operation	
71111.04	Procedures	OP-2307.016	Unit 2 – 2D-11, 2D-12, & 2D-13 Battery Surveillance	45
71111.04	Procedures	OP-2403.033	Unit 2 Class 1E Battery Charger Load Test for 2D31A	16
71111.04	Procedures	OP-2403.052	Unit 2 2D11, 2D12, 2D13 Battery Bank Maintenance	11
71111.05	Calculations	CALC-09-E-0008-01	ANO-1 NFPA 805 Non-Power Operations Assessment	
71111.05	Corrective Action Documents	CR-ANO-	1-2023-00214, 2-2022-00091, 2-2023-00093, 2-2023-00095, 2-2023-00096, C-2022-00827, C-2022-02338, C-2022-03111, C-2022-03303	
71111.05	Drawings	FP-2102	Fire Zone Operating Floor Plan EL. 386'-0"	39
71111.05	Drawings	FP-2103	Fire Zone Operating Floor Plan EL. 368'-0" and 372'-0"	38
71111.05	Drawings	FP-2104	Fire Zone Operating Floor Plan EL. 354'-0"	41
71111.05	Drawings	FP-2105	Fire Zone Operating Floor Plan EL. 335'-0"	29
71111.05	Drawings	FZ-1036	Fire Zone Detail Lube Oil Storage Tank Room	3
71111.05	Drawings	FZ-2100-Z	Fire Zone Detail South Switchgear (2A4) Room	5
71111.05	Miscellaneous	FBDRL-2023-03	Unit 1 T-26 Clean and Dirty Lube Oil	0
71111.05	Miscellaneous	FHA	Fire Hazards Analysis	21, 22
71111.05	Miscellaneous	PFP-U1	ANO Prefire Plan (Unit 1)	21
71111.05	Miscellaneous	PFP-U1	Unit 1 Prefire Plans	3
71111.05	Miscellaneous	PFP-U2	Unit 2 Prefire Plans	17

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71111.05	Miscellaneous	PFP-U2	Unit 2 Prefire Plans	18
71111.05	Procedures	EN-OP-125	Fire Brigade Drills	0
71111.05	Procedures	OP-2203.034	Fire or Explosion	28
71111.05	Procedures	OP-2203.049	Fires in Areas Affecting Safe Shutdown	21
71111.06	Calculations	CALC-ANOC-CS-15-00012	ANO Flood Protection Room Evaluations – Unit 1 and 2	3
71111.06	Drawings	C-48	Diesel Fuel Storage Vault Sections and Details	9
71111.06	Miscellaneous	CES-02	ANO-1 General Structural Design Guide	0
71111.06	Miscellaneous	CES-03	ANO-2 General Structural Design Guide	2
71111.06	Miscellaneous	ULD-0-TOP-17	ANO Flooding	1
71111.11Q	Procedures	OP-1102.004	Power Operation	80
71111.11Q	Procedures	OP-1105.004	Integrated Control System	39
71111.11Q	Procedures	OP-1202.006	Tube Rupture	24
71111.11Q	Procedures	OP-1203.040	Forced Flow Cooldown	16
71111.11Q	Work Orders	WO	591555	
71111.12	Corrective Action Documents	CR-ANO-	1-2019-03957, 1-2019-04035, 1-2022-01870, 1-2022-01871, 1-2022-01897, 1-2023-00275, 1-2023-00276, 1-2023-00277, 1-2023-00301, 1-2023-00393, 1-2023-00401, 2-2020-02739, 2-2021-00361, 2-2021-02520, 2-2022-00060, 2-2023-00108, C-2017-03564, C-2023-00632, C-2023-00846, C-2023-00853, C-2023-00864, C-2023-00865, C-2023-00871	
71111.12	Miscellaneous		Limitorque Technical Update 14-01	08/25/2014
71111.12	Miscellaneous		Operation and Maintenance Manual High-Range Gamma Radiation Monitoring System	November 1981
71111.12	Miscellaneous	EN-MA-125	Troubleshooting Control of Maintenance Activities	27
71111.12	Miscellaneous	EN-MA-141	Limitorque Valve Operator Model SMB/B/SBD-000 Through 5 MOV and HBC Periodic Inspection	21
71111.12	Miscellaneous	TDS170 0040	Installation and Operating Manual for JL Shepherd Shielded Calibration Range Model 89	03/22/1989
71111.12	Procedures	OP-1304.160	Unit 1 Reactor Building Area Radiation Monitoring System Calibration	14
71111.12	Procedures	OP-1305.001	Radiation Monitoring System Check and Test	31
71111.12	Procedures	OP-1313.061	Shepherd Model 89-400 Source Calibration and Operation	3

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71111.12	Procedures	OP-2104.039	HPSI System Operation	94
71111.12	Procedures	OP-2304.028	Unit 2 Area Radiation Monitoring System Calibration	20
71111.12	Work Orders	WO	528327, 547041, 591642, 52842497, 52924456, 52969011, 52978662, 52980938, 52983930	
71111.13	Corrective Action Documents	CR-ANO-	2-2023-00102, 2-2023-00130	
71111.13	Miscellaneous		Technical Specifications – Unit 2	331-B86
71111.13	Miscellaneous	COPD-024	Risk Assessment Guidelines	74
71111.13	Miscellaneous	EN-WM-104	On Line Risk Assessment	22
71111.13	Miscellaneous	TRM-U1	Technical Requirements Manual – Unit 1	76
71111.13	Miscellaneous	TRM-U2	Technical Requirements Manual – Unit 2	87
71111.13	Procedures	OP-1001.008	Surveillance Frequency Control Program	7
71111.13	Work Orders	WO	53014077, 53007816, 53009260,	
71111.15	Corrective Action Documents	CR-ANO-	1-2007-00959, 1-2021-02658, 1-2022-02951, 1-2023-00172, 1-2023-00202, 1-2023-00243, 1-2023-00273, 1-2023-00297, 1-2023-00313, 1-2023-00337, 1-2023-00353, 1-2023-00410, 1-2023-00508, 1-2023-00537, 1-2023-00808	
71111.15	Engineering Changes	EC-0000094023	ANO1 1R30 Steam Generator Thermal Cycle Evaluation	
71111.15	Engineering Evaluations	EC-0000090617	1R29 Steam Generator Condition Monitoring and Final Operational Assessment	0
71111.15	Engineering Evaluations	EC-0000094023	ANO1 1R30 Steam Generator Thermal Cycle Evaluation	0
71111.15	Miscellaneous	95-R-1007-00	ANO-1 ICCMDS Functional Requirements Specification	0
71111.15	Procedures	EN-EP-202	Equipment Important to Emergency Response (EITER)	4
71111.15	Procedures	EN-EP-202-01	ANO EITER Matrix	0
71111.15	Procedures	EN-OP-104	Operability Determination Process	18
71111.15	Procedures	OP-1102.010	Plant Shutdown and Cooldown	90
71111.15	Procedures	OP-1104.029	Service Water and Auxiliary Cooling System	127
71111.15	Procedures	OP-1312.006	ICCMDS Calibration Check Train “A”	5
71111.15	Procedures	OP-1312.007	ICCMDS Calibration Check Train “B”	4
71111.15	Work Orders	WO	455328, 471429, 546835, 563524, 588765, 590354, 52983646, 52983753	

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71111.18	Corrective Action Documents	CR-ANO-	1-2023-00252, 1-2023-00269	
71111.18	Miscellaneous	TD G080.0560	Instructions – Overpower and Underpower Relay	06/05/1992
71111.18	Procedures	EN-DC-136	Temporary Modifications	21
71111.18	Work Orders	WO	591555,	
71111.24	Corrective Action Documents	CR-ANO-	1-2023-00283, 2-2021-02906, 2-2021-02958, 2-2023-00090, 2-2023-00102, 2-2023-00289, 2-2023-00308, 2-2023-00311	
71111.24	Procedures	EN-IS-123	Electrical Safety	22
71111.24	Procedures	EN-MA-141	Limatorque Valve Operator Model SMB/SB/SBD-000 Through 5 MOV and HBC Periodic Inspection	21
71111.24	Procedures	EN-MA-141	Limatorque Valve Operator Model SMB/SB/SBD-000 Through 5 MOV and HBC Periodic Inspection	22
71111.24	Procedures	OP-1307.063	Unit 1 D06 and D07 Battery Surveillance	44
71111.24	Procedures	OP-2104.039	HPSI System Operation	94
71111.24	Procedures	OP-22104.036	Emergency Diesel Generator Operations	104
71111.24	Procedures	OP-2304.038	Unit 2 Plant Protection System Channel B Test	51
71111.24	Procedures	OP-2305.002	Reactor Coolant System Leak Detection	28
71111.24	Work Orders	WO	52979561, 52980211, 52998173, 53012273, 53018478, 53023707, 53024323,	
71114.06	Miscellaneous		Arkansas Nuclear One Emergency Plan	12/15/2021
71114.06	Miscellaneous		2023 ANO 23FSD1 Green Team	03/02/2023
71151	Miscellaneous		ANO-1 and ANO-2 NRC Performance Indicator Technique/Data Sheets – Initiating Events	Q1-2022
71151	Miscellaneous		ANO-1 and ANO-2 NRC Performance Indicator Technique/Data Sheets – Initiating Events	Q2-2022
71151	Miscellaneous		ANO-1 and ANO-2 NRC Performance Indicator Technique/Data Sheets – Initiating Events	Q3-2022
71151	Miscellaneous		ANO-1 and ANO-2 NRC Performance Indicator Technique/Data Sheets – Initiating Events	Q4-2022
71151	Procedures	EN-LI-114	Regulatory Performance Indicator Process	20

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71153	Corrective Action Documents	CR-ANO-	1-2021-03129, 1-2023-00290, 1-2023-00296, 1-2023-00297, 2-2023-00049	
71153	Miscellaneous	NRC Form 361	Reactor Plant Event Notification Worksheet	02/14/2023
71153	Procedures	OP-1000.043	Steam Generator Water Chemistry Monitoring Unit Two	28
71153	Procedures	OP-1052.007	Secondary Chemistry Monitoring	45
71153	Procedures	OP-1202.001	Reactor Trip	41
71153	Procedures	OP-2104.008	Circulating Water System Operation	71