

Arkansas Nuclear 2

1Q/2014 Plant Inspection Findings

Initiating Events

Significance:  Mar 31, 2014

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Correctly Install Flexible Link Bolted Connection on Phase C of 6.9 kV Bus

Inspectors documented a self-revealing finding for the licensee's failure to correctly install the flexible link bolted connection on phase C of the 6.9 kV non segregated bus of the Unit 2 auxiliary transformer, which contributed to the explosion of the Unit 2 auxiliary transformer. The licensee documented the issue in Condition Report CR-ANO-2-2013-02242. The licensee aligned startup transformer 3 (preferred offsite power source) to carry the plant loads during normal power operations and restarted the plant on January 10, 2014.

Inspectors concluded that the licensee's failure to correctly install the flexible link bolted connection on phase C of the Unit 2 auxiliary transformer 6.9 kV bus was a performance deficiency. The performance deficiency was more than minor because it was 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 critical safety functions during shutdown as well as power operations. Specifically, the incorrectly installed flexible link bolted connection resulted in a reactor trip. Using Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," June 19, 2012, and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," June 19, 2012, Exhibit 1, "Initiating Events Screening Questions," the inspectors determined that the finding was of very low safety significance (Green) because the finding did not result in a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition. Specifically, Unit 2 would have tripped without explosion of the auxiliary transformer, and without subsequent loss of power to startup transformer 3, if the differential current relay wire had been correctly landed.

This finding did not have a cross-cutting aspect associated with it because the most significant contributor was not indicative of present performance. Specifically, the flexible links and insulation had been installed in this configuration since at least 1979.

Inspection Report# : [2014002](#) (*pdf*)

Significance:  Mar 31, 2014

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Land Signal Wire from Differential Relay Output to Generator Lockout Relay

Inspectors documented a self-revealing finding for the licensee's failure to correctly land the signal wire from the Unit 2 auxiliary transformer differential relay output contacts to the main generator lockout relay, which contributed to the explosion of the Unit 2 auxiliary transformer. The licensee documented the issue in Condition Report CR ANO 2 2013 02242. The licensee aligned startup transformer 3 (preferred offsite power source) to carry the plant loads during normal power operations and restarted the plant on January 10, 2014.

Inspectors concluded that the licensee's failure to correctly land the wire, in accordance with the drawing, in the

common circuit for the differential current relays was a performance deficiency. The performance deficiency was more than minor because it was 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 critical safety functions during shutdown as well as power operations. Specifically, the non-landed wire resulted in catastrophic failure of the Unit 2 auxiliary transformer after a fault occurred. Using Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," June 19, 2012, and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," June 19, 2012, Exhibit 1, "Initiating Events Screening Questions," the inspectors determined that the finding was of very low safety significance (Green) because the finding did not result in a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition. Specifically, a fault would not have originated in phase C of the 6.9 kV bus of the auxiliary transformer if the flexible link had been correctly installed; the non-landed differential current relay wire only served to increase the likelihood of transformer explosion in the event of a fault on the 6.9 kV bus.

This finding did not have a cross-cutting aspect associated with it because the most significant contributor was not indicative of present performance. Specifically, the last time the wire could have been removed was 1995.

Inspection Report# : [2014002](#) (*pdf*)

Mitigating Systems

Significance: G Mar 31, 2014

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Maintain Alternate ac Diesel Generator Governor

The inspectors documented a self-revealing non-cited violation of 10 CFR 50.63, "Loss of all alternating current power," for the licensee's failure to maintain the alternate ac diesel generator so that a power source would be available to withstand and recover from a station blackout. Specifically, the licensee failed to perform adequate preventive maintenance on the governor of the diesel in accordance with the recommended vendor maintenance, which resulted in an overspeed trip of the engine during testing. The licensee repaired the governor and documented the issue in Condition Report CR-ANO-C-2013-00331.

The inspectors determined that the failure to perform adequate preventive maintenance on the governor of the alternate ac diesel generator in accordance with the recommended vendor maintenance was a performance deficiency. This performance deficiency was more than minor because it was associated with the equipment performance attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and was therefore a finding. Specifically, the reliability of the alternate ac diesel generator was adversely affected by the lack of governor maintenance so that the diesel was unavailable to respond to a postulated station blackout. Using Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," June 19, 2012, and Appendix A, "The Significance Determination Process (SDP) for Findings at Power," June 19, 2012, Exhibit 2, "Mitigating System Screening Questions," the inspectors determined that the finding required a detailed risk evaluation because it was an actual loss of function of a non-technical specification train of equipment designated as high safety-significant in accordance with the licensee's maintenance rule program for greater than 24 hours. The Region IV senior reactor analyst performed a detailed risk evaluation in accordance with Appendix A, Section 6.0, "Detailed Risk Evaluation." The risk was dominated by internal loss of offsite power initiators and fire-induced loss of offsite power scenarios. The calculated change in core damage frequency was 8.9×10^{-7} for Unit 1 and 5.6×10^{-7} for Unit 2. The analyst also determined that the finding would not involve a significant increase in the risk of a large, early release of radiation.

This finding has been determined to be of very low safety significance (Green).

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).

Inspection Report# : [2014002](#) (*pdf*)

Significance:  Dec 31, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Operability Evaluation Due to Failure to Characterize Weld Flaw

Inspectors identified a non-cited violation of 10 CFR 50.55a(b)(5), “In-Service Inspection Code Cases,” for the licensee’s failure to implement ASME Code Case N-513-2, “Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping, Section XI, Division 1.” Specifically, when a service water weld developed a leak, the licensee failed to characterize the flaw using a volumetric inspection method. The licensee corrected the condition by performing volumetric inspections of the flawed weld and then repaired the weld. The licensee entered this issue into their corrective action program as Condition Report CR-ANO-2-2013-01961.

Inspectors concluded that the licensee’s failure to characterize a service water weld flaw 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 is therefore a finding. Specifically, the licensee failed to ensure the reliability of the service water system wasn’t adversely affected by a significant weld flaw. 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 this finding was of very low safety significance (Green) because the degraded condition was not a design deficiency that affected system operability; did not represent an actual loss of function or a system; did not represent an actual loss of function of a single train or two separate trains for greater than its technical specification allowed outage time; did not represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety significant; and did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic event.

The finding was determined to have a cross-cutting aspect in the area of human performance, associated with resources, for the licensee’s failure to ensure adequate training of personnel. Specifically, personnel performing the flaw inspection were not adequately trained in the non-destructive testing requirements of the code case.

Inspection Report# : [2013005](#) (*pdf*)

Significance:  Nov 19, 2013

Identified By: NRC

Item Type: FIN Finding

Emergency Lights Satisfied their Maintenance Rule Performance Criteria

The team identified a finding for the failure to provide an adequate testing scheme to demonstrate that the Appendix R emergency lights satisfied their maintenance rule performance criteria. The team determined that operators were provided flashlights when they obtained the equipment bags required to perform an alternative shutdown. The licensee entered the issue into the corrective action program.

The failure to provide an adequate testing scheme to demonstrate that the Appendix R emergency lights satisfied their maintenance rule performance criteria was a performance deficiency. The performance deficiency was more than

minor because if left uncorrected, the performance deficiency would have the potential to lead to a more significant safety concern.

The team assigned the finding a low degradation rating since the ability to reach and maintain safe shutdown conditions in the event of a control room fire would be minimally impacted by the potential failure of the emergency lights to function for 8-hours. Specifically, the team determined that the results of the previous annual 8-hour discharge tests provided reasonable assurance that the lights would function for 8 hours since the licensee had maintained the same battery replacement frequency. Because this finding had a low degradation rating, it screened as having very low safety significance. This finding had a cross-cutting aspect in the decision making component of the human performance area because the licensee's decisions failed to demonstrate that nuclear safety is an overriding priority. Specifically, the licensee failed to use conservative assumptions in decision making when changing the testing scheme for the Appendix R emergency lights. The team determined that the licensee failed to use conservative assumptions in decision making because the licensee failed to consider how the revised testing scheme would impact the maintenance rule program or demonstrate compliance with 10 CFR Part 50, Appendix R, Section III.J

Inspection Report# : [2013009](#) (pdf)

Significance:  Sep 30, 2013

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Perform Preventive Maintenance on Plant Protection System Test Switch

The inspectors documented a self-revealing non-cited violation of Technical Specification 6.4.1.a for the licensee's failure to implement procedures specified by Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Specifically, the licensee failed to implement a preventive maintenance task to periodically replace matrix test switches after the switches were installed. A new test switch was installed and replacement of similar switches was scheduled for the next refueling outage. The licensee entered this issue into their corrective action program as Condition Report CR-ANO-2-2013-0005.

The inspectors determined that the failure to implement preventive maintenance to replace the matrix test switches was a performance deficiency. The performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and was therefore a finding. Specifically, the degraded switch caused a safety system actuation, which resulted in the high pressure safety injection and the low pressure safety injection pumps to be placed in pull-to-lock, adversely affecting the availability of this equipment. Using Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings at Power," the inspectors determined that the finding required a detailed risk evaluation because it represented a loss of function. A Region IV senior reactor analyst performed the detailed risk evaluation. The exposure period was 48 minutes. The change to the core damage frequency was of 2.3 E-7 (Green). The dominant core damage sequences included inadvertent safety valve openings and small break loss of coolant accidents without injection available. 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.

Inspection Report# : [2013004](#) (pdf)

Significance:  Jun 30, 2013

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Correctly Install Control Room Emergency Chiller Supply Breaker

Inspectors documented a Green self-revealing non-cited violation of Technical Specification 6.4.1.a for the licensee's failure to implement procedures recommended by Regulatory Guide 1.33, Revision 2, Appendix A, February 1978.

Specifically, the licensee failed to follow procedures for the replacement of the supply breaker for control room emergency chiller 2VE-1A. As a result, the breaker was installed incorrectly and the chiller was inoperable for over two months. Immediate corrective actions included proper installation of the breaker and procedural requirements for visual verification of breaker configuration. The licensee documented the issue in their corrective action program as CR-ANO-2-2013-00233.

Inspectors concluded that the failure to follow Procedure 1403.179 for replacement of the train A control room emergency chiller breaker is a performance deficiency. The performance deficiency is 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 is therefore a finding. Specifically, the loose breaker connection adversely affected the availability and reliability of the control room emergency chiller A. Using Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings at Power," the inspectors determined that the finding required a detailed risk evaluation because it represented an actual loss of function of a single train for longer than its technical specification allowed outage time. The senior reactor analyst performed a detailed risk evaluation using the Arkansas Nuclear One Standardized Plant Analysis Risk models. The dominant risk sequences include a seismically-induced loss of offsite power with the failure of control room emergency chiller A. The analyst assumed that the operators and control room instrumentation could survive a peak control room temperature of 120° F, and that chiller A was susceptible to failure during a seismic event for the 83 days. None of the core damage sequences affected by this performance deficiency were important to the large, early release frequency. Therefore, based on the combined internal and seismic ICCDP of 2.9×10^{-7} , this finding was of very low safety significance (Green). The finding was determined to have a cross-cutting aspect in the area of human performance, associated with work practices, in that the licensee failed to use work practices that support human performance. Specifically, licensee personnel were aware of the possibility of misaligning the wire grip style lug, but failed to use adequate self and peer checking to ensure the lug was correctly installed

Inspection Report# : [2013003](#) (*pdf*)

Barrier Integrity

Significance:  Jun 30, 2013

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Evaluate and Correct Excessive Containment Isolation Valve Leakage

The inspectors identified a non-cited violation of Unit 2 Technical Specification 6.5.16, "Containment Leakage Rate Testing Program," for the failure to evaluate and take appropriate corrective actions to achieve acceptable performance for containment isolation valves that exceed the local leak rate administrative limit. The licensee entered this issue into the corrective action program as Condition Report CR-ANO-2-2013-01370.

The failure to perform a cause determination and take appropriate corrective actions for containment isolation valves that exceed the local leak rate administrative limit was a performance deficiency. The performance deficiency was more than minor because it was associated with the procedure quality attribute of the Barrier Integrity Cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events, and is therefore a finding. Specifically, the failure to perform a cause determination and take appropriate corrective actions adversely affected the licensee's ability to ensure containment isolation valves function properly. Using Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings at

Power,” the finding is determined to have very low safety significance because it did not represent an actual open pathway in the physical integrity of reactor containment, containment isolation system, or heat removal components, and the finding did not involve an actual reduction in function of hydrogen igniters in the reactor containment. Since the cause of the performance deficiency occurred more than three years ago, the inspectors concluded that the finding was not representative of current licensee performance and no cross-cutting aspect was assigned

Inspection Report# : [2013003](#) (*pdf*)

Emergency Preparedness

Occupational Radiation Safety

Public Radiation Safety

Security

Although the Security Cornerstone is included in the Reactor Oversight Process assessment program, the Commission has decided that specific information related to findings and performance indicators pertaining to the Security Cornerstone will not be publicly available to ensure that security information is not provided to a possible adversary. Other than the fact that a finding or performance indicator is Green or Greater-Than-Green, security related information will not be displayed on the public web page. Therefore, the [cover letters](#) to security inspection reports may be viewed.

Miscellaneous

Significance: N/A May 03, 2013

Identified By: NRC

Item Type: FIN Finding

Arkansas Nuclear One 2013 Biennial Problem Identification and Resolution Inspection Summary

The team reviewed approximately 150 condition reports, work orders, engineering evaluations, root and apparent cause evaluations, and other supporting documentation to determine if problems were being properly identified, characterized, and entered into the corrective action program for evaluation and resolution. The team reviewed a sample of system health reports, self-assessments, trending reports and metrics, and various other documents related to the corrective action program. The team found that licensee was generally effective at identifying problems and putting them into the corrective action program; however, there were a few instances identified during the assessment period where the licensee had missed identification of problems. The licensee was also generally effective in prioritizing the extent to which individual problems would be evaluated and in establishing schedules for implementing corrective actions. The licensee’s corrective action process was generally found to be effective in documenting and tracking problems to resolution. Corrective actions were generally implemented in a timely manner.

The team determined that the licensee was adequately evaluating industry operating experience. Licensee audits and internal self-assessments were found to be generally effective and highlighted areas of ineffective corrective actions similar to weaknesses identified by the team. The team found that on the basis of focus group interviews and an independent safety culture survey, workers at the site felt free to raise safety concerns using the corrective action program, their management and chain of command, and to the NRC without fear of retaliation.

Inspection Report# : [2013010](#) (*pdf*)

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