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Arkansas Nuclear 1 – Quarterly Plant Inspection Findings

2Q/2017 – Plant Inspection Findings

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Initiating Events

Significance: G Apr 04, 2017

Identified By: NRC

Item Type: NCV Non-Cited Violation

Inadvertent Reactivity Addition

Inspectors documented a Green self-revealing finding and associated non-cited violation of Unit 1 Technical Specification 5.4.1.a. Specifically, the licensee failed to properly pre-plan and perform maintenance of the integrated control system equipment that can affect the performance of safety-related equipment. The licensee failed to plan and perform post-maintenance testing on newly installed integrated control system cards before returning the system to service. As a result, the licensee failed to detect a failed card. When the associated controller was placed into automatic mode, the system responded to a false demand signal that resulted in an inadvertent rod withdrawal that required prompt operator action to terminate the power increase and restore power to the original level. To correct the failed card, the licensee installed a new card that had been tested and validated prior to installation. The licensee documented this issue in Condition Report CR-ANO-1-2016-05551.

Inspectors concluded that the failure to perform a post-maintenance test prior to placing a component in service is a performance deficiency. Specifically, the work order for replacing the steam generator reactor demand circuit card did not include a verification that the system was functioning properly after the replacement card was installed in the plant. The performance deficiency is more than minor because if left uncorrected, the performance deficiency has the potential to become a more significant safety concern. Specifically, if the operator had not taken prompt action to mitigate the event, it could have resulted in a more significant plant transient and could have challenged plant equipment. In accordance with Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," issued October 7, 2016, and Exhibit 1 of IMC 00609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Issued June 19, 2012, the inspectors determined the finding to be of very low safety significance (Green) because the finding is associated with the initiating events cornerstone and did not cause a reactor trip. The finding was determined to have a cross-cutting aspect in the area of human performance associated with Work

Management, because the licensee did not ensure that they followed a process of planning, controlling, and executing the work activities in a formalized manner, allowing the work order to not have complete instructions for a post-maintenance test.

Inspection Report# : 2017001 (*pdf*)

Significance:  Dec 31, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Design Pipe Support for Vibration

The inspectors documented a self-revealed finding and associated non-cited violation of 10 CFR 50 Appendix B Criterion III for the licensee's failure to verify that the decay heat removal (DHR) system drain piping configuration and supports could withstand vibrations created during low pressure and high flow conditions. As a result, a cracked weld and unisolable leak in the DHR system occurred due to high cycle fatigue caused by those conditions. To correct this issue, the licensee repaired the leaking weld and designed and installed a new piping support and piping configuration to reduce vibrations during the expected operating conditions. The licensee entered this issue into the corrective action program as Condition Report CR-ANO-1-2016-03225.

The failure to design the decay heat removal system piping to withstand expected vibrations from the system's cavitating venturis is a performance deficiency. The performance deficiency is 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, inadequate design of the DHR system piping support resulted in a leak that could have challenged the capability of both trains of the DHR system during shutdown on September 29, 2016. The inspectors performed an initial screening of the finding in accordance with NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," issued October 7, 2016, and were directed to IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Screening and Characterization of Findings," since the finding pertained to a degraded condition while the plant was shutdown. Using IMC 0609, Appendix G, Attachment 1, dated May 9, 2014, the inspectors determined that the finding required a Phase 2 evaluation. A senior reactor analyst performed a Phase 2 evaluation in accordance with IMC 0609, Appendix G, Attachment 2, "Phase 2 Significance Determination Process Template for PWR during Shutdown," dated February 28, 2005. The senior reactor analyst performed a Phase 2 evaluation which used realistic break characteristics and plant configuration changes to determine the significance to be of very low safety significance (Green). The inspectors determined this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance. Specifically, the licensee last reviewed and modified the pipe support configuration in 1996.

Inspection Report# : 2016004 (*pdf*)

Significance:  Dec 02, 2016

Identified By: NRC

Item Type: FIN Finding

Failure to Monitor Startup Transformers #1, #2, and #3 Voltage Regulator/Tap Changer Function

The team identified a Green finding for the failure to meet the surveillance standards of IEEE 308-1971, "Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations," Section 5.2.3, "Preferred Power Supply." Specifically, from 2001 to December 2, 2016, the licensee failed to monitor the operation of the voltage regulator/load tap changer functions on startup transformers 1, 2, and 3. In response to this issue, the licensee provided reasonable assurance that the voltage regulator/load tap changer was operating properly based on review of plant computer voltage plot data following an Arkansas Nuclear

One, Unit 1 trip that occurred on December 14, 2015. This finding was entered into the licensee's corrective action program as Condition Reports CR-ANO-C-2016-4777, CR-ANO-C-2016-4879, and CR-ANO-C-2016-5015.

The team determined that the failure to monitor startup transformers 1, 2, and 3 voltage regulator/load tap changers to the extent that they are shown to be ready to perform their intended function, in accordance with IEEE Standard 308-1971, was a performance deficiency. The finding was determined to be more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences. Specifically, the failure to monitor the adequacy of the voltage supplied from startup transformers 1, 2, and 3 voltage regulator/load tap changer did not ensure that offsite power would be available to perform its necessary functions to provide power to the safety-related mitigation equipment. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the issue screened as having very low safety significance (Green) because it was a design or qualification deficiency that did not represent a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; did not result in the loss of one or more trains of non-technical specification equipment; and did not screen as potentially risk-significant due to seismic, flooding, or severe weather. This finding did not have a cross-cutting aspect because the performance deficiency did not reflect current licensee performance.
Inspection Report# : 2016008 (*pdf*)

Significance: Y Feb 10, 2014

Identified By: NRC

Item Type: VIO Violation

Unit 1 - Failure to Follow the Materials Handling Program during the Unit 1 Generator Stator Move

Unit 1 Apparent Violation. The inspectors reviewed a self-revealing apparent violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," which states, in part, that "activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures or drawings." The licensee did not follow the requirements specified in Procedure EN-MA-119, "Material Handling Program," in that, the licensee did not perform an adequate review of the subcontractor's lifting rig design calculation and the licensee failed to conduct a load test of the lifting rig prior to use. The licensee initiated Condition Report CR-ANO-C-2013-00888 to capture this issue in the corrective action program. The licensee's corrective actions included repairing damage to the Unit 1 turbine deck, fire main system, and electrical system. In addition, changes were made to various procedures including Procedure EN-DC-114, "Project Management," to provide guidance on review of calculations, quality requirements, and standards associated with third party reviews.

The inspectors determined that the finding was more than minor because it was associated with the procedural control attribute of the initiating event cornerstone, and adversely affected the cornerstone's objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown, as well as power operations. The stator drop affected offsite power to Unit 1, resulting in a loss of offsite power for approximately 6 days and a loss of the alternate AC diesel generator. The inspectors used Inspection Manual Chapter 0609, Attachment 0609.04, "Initial Characterization of Findings," dated June 19, 2012, to evaluate the significance of the finding. Since the plant was shutdown, the inspectors were directed to Inspection Manual Chapter 0609, Appendix G, Attachment 1,

"Shutdown Operations Significance Determination Process Phase 1 Operational Checklists for Both PWRs and BWRs," Checklist 4, dated May 25, 2004. Using Appendix G, Attachment 1, Checklist 4, the inspectors concluded that this finding represented a degradation of the licensee's ability to add reactor coolant system inventory when needed since a loss of offsite power occurred and therefore, this finding required a Phase 3 analysis. A shutdown risk model was developed by modifying the at-power Arkansas Nuclear One Unit 1 Standardized Plant Analysis Risk Model, Revision 8.19. The NRC risk analyst assessed the significance of shutdown events by calculating an instantaneous conditional core damage probability. The results were dominated by two sequences. The largest risk contributor (approximately 97 percent) was based on a failure of the emergency diesel generators without recovery. The second largest risk contributor was the failure to recover decay heat removal. The result of the analysis was an instantaneous conditional core damage probability of $3.8E-4$; therefore, this finding was preliminarily determined to have high safety significance (Red).

This finding had a cross-cutting aspect in the area of human performance associated with field presence, because the licensee did not ensure adequate supervisory and management oversight of work activities, including contractors and supplemental personnel. Specifically, the licensee did not provide a sufficient level of oversight in that, the requirements in Procedure EN-MA-119, for design approval and load testing of the temporary hoisting assembly, were not followed [H.2].

Issued as preliminary Red AV in IR 05000313,368/2013012 dated March 24, 2014.

Final significance was determined to be Yellow. NOV issued in IR 05000313,368/2014008 dated June 23, 2014.

Inspection Report# : 2016007 (*pdf*)

Inspection Report# : 2013012 (*pdf*)

Inspection Report# : 2014008 (*pdf*)

Inspection Report# : 2016008 (*pdf*)

Mitigating Systems

Significance:  May 01, 2017

Identified By: NRC

Item Type: FIN Finding

Inadequate FLEX Power Supply Connections

The team identified a finding for the failure to assure that FLEX power supply connections would be reliable following all required postulated beyond design basis external events. Specifically, the team identified that one installed cable configuration could potentially be damaged during high wind events preventing operation of the portable diesel generator required to operate plant equipment. This issue was entered into the licensee's corrective action program as Condition Report CR-ANO-C-2017-00316.

The failure to adequately install the electrical modification for connecting the portable diesel generator was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external factors attribute of the Mitigating Systems Cornerstone and adversely affected the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The significance of the finding was evaluated using NRC Inspection Manual Chapter 0609, Appendix O, "Significance Determination Process for Mitigating Strategies and Spent Fuel Pool Instrumentation (Orders EA-12-049 and EA-12-051)," dated October 7, 2016, and Appendix M, "Significance Determination Process Using Qualitative Criteria," dated April 12, 2012. A bounding evaluation was performed using the exposure time, tornado frequency, and frequency of a random failure of both emergency diesel generators. The licensee's compliance date with the order was January 12, 2016, so an exposure time of one year was used. The tornado frequency selected was for an F2 or greater tornado striking the site ($5.31E-5$ /year). The random

failure frequency of both unit's emergency diesel generators ($3.15E-3/\text{year}$) was selected since the emergency diesel generators are protected from damage during high wind events. This is a conservative bounding analysis because it assumes that any tornado would result in damage causing a loss of offsite power and damage the cables in terminal panel 2TB1011 on the roof. The change in core damage frequency for the finding was determined to be $1.67E-7/\text{year}$. Therefore, the finding was determined to a very low risk significance. The finding had a cross-cutting aspect in the challenge to the unknown component of Human Performance because the licensee failed to adequately address all potential damage scenarios when developing the modification design requirements for beyond design basis external events.

Inspection Report# : 2017008 (*pdf*)

Significance:  May 01, 2017

Identified By: NRC

Item Type: FIN Finding

Inadequate FLEX Procedures

The team identified a finding with three examples for the licensee failing to assure that FLEX procedures were adequate for implementation of the strategies credited in the licensee's Final Implementation Plan. This issue was entered into the licensee's corrective action program as Condition Reports CR-ANO-C-2017-00341, CR-ANO-C 2017-00344, CR-ANO-1-2017-00250, and CR-ANO-C-2017-00295.

The failure to provide adequate procedures for responding to an extended loss of all AC power due to a flooding or high wind event was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external factors attribute of the Mitigating Systems Cornerstone and adversely affected the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The significance of the finding was evaluated using NRC Inspection Manual Chapter 0609, Appendix O, "Significance Determination Process for Mitigating Strategies and Spent Fuel Pool Instrumentation (Orders EA-12-049 and EA-12-051)," dated October 7, 2016, and Appendix M, "Significance Determination Process Using Qualitative Criteria," dated April 12, 2012. A bounding evaluation was performed using the exposure time, frequency of random failure of both emergency diesel generators, and tornado frequency or flood frequency. The licensee's order compliance date was January 12, 2016, so an exposure time of one year was used. The random failure frequency of both unit's emergency diesel generators ($3.15E-3/\text{year}$) was selected since the emergency diesel generators are protected from damage during high wind and flood events. For the two examples impacted by flood events, the flood frequency selected was for a flood exceeding the site elevation ($8.47E-5/\text{year}$). The change in core damage frequency for these examples was determined to be $2.67E-7/\text{year}$. For the example which would only impact the licensee's response to a high wind event, the tornado frequency selected was for an F2 or greater tornado striking the site ($5.31E-5/\text{year}$). The change in core damage frequency for this example was determined to be $1.67E-7/\text{year}$. Therefore, the three examples of the finding were determined to of very low risk significance. The finding had a cross-cutting aspect in the Procedure Adherence component of the Human Performance area because the licensee failed to adequately perform reviews required by the licensee's procedure control program to confirm that: (1) instructions for implementing the strategies in the licensee's Final Implementation Plan were complete and appropriate; and (2) reviews for affected procedures related to other procedure revisions identified impacts on the implementing strategies and revised them appropriately.

Inspection Report# : 2017008 (*pdf*)

Significance:  Apr 04, 2017

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Evaluate All Required Functions for Operability

The inspectors identified a finding and an associated non-cited violation of 10 CFR 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, for failure to evaluate the impact of all the required safety functions for operability when the valve failed to fully open during a valid demand. Specifically, the licensee failed to evaluate the operability impact on the safety function to close for the Unit 1 motor-operated borated water storage tank outlet valve CV-1408 before de-energizing and locking open the valve and declaring it operable. After the inspectors questioned this decision, the licensee declared the valve inoperable and repaired the valve operator. The licensee documented this issue in Condition Report CR-ANO-1-2017-00324.

The failure to evaluate the operability impact of all required safety functions for Unit 1 motor-operated valve, CV-1408, before de-energizing and locking open the valve is a performance deficiency. The performance deficiency is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the availability of systems that respond to initiating events to prevent undesirable consequences. Specifically, by locking the valve open, the licensee prevented Train B of the emergency core cooling system from being able to be remotely isolated from the borated water storage tank during the containment recirculation phase of a potential loss of coolant accident, which could have allowed air binding of the pumps. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the issue screened as having very low safety significance (Green) because it was not a design or qualification deficiency; did not represent a loss of system; did not result in the actual loss of function of a train of technical specification equipment for greater than its allowed outage time; and did not screen as potentially risk significant due to seismic, flooding, or severe weather. The inspectors determined that this finding has a cross cutting aspect in the human performance area of Consistent Process, because the performance deficiency was caused by not following a consistent, systematic approach to making a decision concerning operability of the affected train.

Inspection Report# : 2017001 (*pdf*)

Significance:  Mar 31, 2017

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Identify Damaged Lugs

The inspectors documented a self-revealing finding and associated non-cited violation of Unit 1 Technical Specification 5.4.1.a, for the failure to properly perform maintenance on the Unit 1 suction valve to the emergency core cooling system B and containment spray B. Specifically, the licensee failed to identify a damaged electrical lug on the valve actuator during maintenance. The lug subsequently failed and the valve failed to stroke fully open after being returned to service. The licensee repaired the lug and restored the valve to service. The licensee documented this issue in Condition Report CR-ANO-1-2017-00270.

The licensee failed to identify a damaged electrical lug on a motor-operated valve during maintenance, which is a performance deficiency. The performance deficiency is more than minor because it is associated with the human performance attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the performance deficiency resulted in the failure of a suction valve for one train of emergency core cooling systems and containment spray systems after the valve was returned to service from the maintenance. Using Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the inspectors determined that the finding required a detailed risk evaluation because the finding represented an actual loss of function of a single train for greater than its technical specification allowed outage time. The analyst determined in a detailed risk evaluation that by combining internal and external event inputs yielded an estimate of the total increase in core damage frequency of 8.5E-7/year, or

of very low safety significance (Green). The finding was determined to have a cross-cutting aspect in the area of human performance associated with Avoid Complacency because the primary cause of the performance deficiency involved the failure to plan for the possibility of mistakes and use appropriate error reduction tools.
Inspection Report# : 2017001 (*pdf*)

Significance: G Dec 02, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Verify the Adequacy of Motor Operated Valve Thermal Overload Devices

The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," which states, in part, design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Specifically, prior to December 2, 2016, the licensee failed to use appropriate assumptions in thermal overload device calculations and failed to establish a suitable periodic test program for safety-related Unit 1 motor operated valve thermal overload device trip setpoints, as discussed in Regulatory Guide 1.106, Regulatory Position C.2. In response to this issue, the licensee demonstrated reasonable assurance of operability by using the results of the 18-month high pressure injection system valve testing which required multiple stroking of block valves to obtain various flows without tripping the thermal overload devices. This finding was entered into the licensee's corrective action program as Condition Reports CR-ANO-C-2016-5017 and CR-ANO-1-2016-5130.

The team determined that the failure to meet the intent of Regulatory Guide 1.106, Regulatory Position C.2 was a performance deficiency. The finding was determined to be more than minor because it was associated with the Mitigating Systems Cornerstone attribute of equipment performance and affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences. Specifically, the failure to verify the adequacy of the design and perform suitable testing for thermal overload device setpoint drift did not ensure that the safety-related motor operated valves would be available to throttle the associated system flows during a design basis accident. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the issue screened as having very low safety significance (Green) because it was a design or qualification deficiency that did not represent a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; did not result in the loss of one or more trains of non-technical specification equipment; and did not screen as potentially risk-significant due to seismic, flooding, or severe weather. This finding had a cross-cutting aspect in the area of problem identification and resolution associated with evaluations because the licensee failed to thoroughly evaluate issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. Specifically, the licensee failed to thoroughly evaluate Condition Report CR-ANO-1-2016-0778 which documented NRC inspector concerns associated with design and testing of motor operated valve thermal overload devices.

Inspection Report# : 2016008 (*pdf*)

Significance:  Dec 02, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Incorporate Safety Guide 9 Criteria into Surveillance Procedures

The team identified Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," which states, "A test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents." Additionally, "Test results shall be documented and evaluated to assure that test requirements have been satisfied." Specifically, as of December 2, 2016, Units 1 and 2 emergency diesel generator surveillance procedures failed to incorporate the applicable voltage and frequency limits of NRC Safety Guide 9, and did not consistently document or evaluate results to assure test requirements have been satisfied. In response to this issue, the licensee provided the team test results which demonstrated that an immediate safety concern was not present. This finding was entered into the licensee's corrective action program as Condition Reports CR-ANO-1-2016-4785 and CR-ANO-2-2016-4257.

The team determined that the failure to incorporate the acceptance limits of NRC Safety Guide 9 into surveillance test procedures for emergency diesel generators and assure that test requirements have been satisfied in accordance with 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the procedure quality attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences, and would have the potential to lead to a more significant safety concern. Specifically, the failure to incorporate appropriate acceptance criteria in test procedures and assure that the criteria have been satisfied had the potential to lead to a worse condition, if left uncorrected. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the issue screened as having very low safety significance (Green) because it was a design or qualification deficiency that did not represent a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; did not result in the loss of one or more trains of non-technical specification equipment; and did not screen as potentially risk-significant due to seismic, flooding, or severe weather. This finding did not have a cross-cutting aspect because the performance deficiency did not reflect current licensee performance.

Inspection Report# : 2016008 (*pdf*)

Significance:  Dec 02, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Perform an Adequate Emergency Feedwater Pump Suction Transfer Design Calculation or Testing

The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," which states, in part that, design control measures shall

provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Specifically, prior to December 22, 2016, the licensee failed to verify the adequacy of the emergency feedwater suction transfer procedure by determining if the qualified condensate storage tank will be completely empty of water, possibly causing an air ingestion failure of the Unit 1 emergency feedwater pumps, prior to transferring to the credited safety-related alternate suction source. In response to this issue, the licensee resolved the immediate safety concern by revising the emergency feedwater pump operating procedure, removing the steps that were the cause of the concern. This finding was entered into the licensee's corrective action program as Condition Reports CR-ANO-1-2016-5166, CR-ANO-1-2016-5725, and CR-ANO-1-2017-0040.

The team determined that the failure to verify the adequacy of the design of the Unit 1 emergency feedwater suction from the qualified condensate storage tank to alternate sources of water by performance of design review, by use of calculational methods, or by performance of a suitable testing program in accordance with 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the reliability, availability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to have adequate measures in place to ensure an acceptable design analysis or a suitable test program would verify that the process of transferring emergency feedwater suction from the qualified storage tank to the alternate sources ensures the capability of the Unit 1 emergency feedwater system to perform its safety function. In accordance with Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," dated June 19, 2012, the team determined this finding affected the secondary short term heat removal function of the Mitigating Systems Cornerstone. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the finding represented a loss of the emergency feedwater system and function. Therefore, a detailed risk evaluation was necessary. The senior reactor analyst determined that the change in core damage frequency of this finding was 7×10^{-7} per year, therefore the significance was of very low safety significance (Green). This finding did not have a cross-cutting aspect because the performance deficiency did not reflect current licensee performance.

Inspection Report# : 2016008 (*pdf*)

Significance:  Dec 02, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Ensure Safety Systems Would Survive Sustained Degraded Voltage Conditions

The team identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," which states, in part, design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Specifically, from December 17, 1979, to December 2, 2016, the licensee did not verify that the design of the protective devices for the loads required at the beginning of a loss-of-coolant accident were adequate to prevent tripping these devices

under degraded voltage conditions, which would render the affected loads non-functional. In response to this issue, the licensee performed a preliminary analysis to determine that the protective overload devices would not cause safety equipment to fail at degraded voltages allowed by technical specifications. This finding was entered into the licensee's corrective action program as Condition Reports CR-ANO-C-2016-5027 and CR-ANO-C-2016-5191.

The team determined that the failure to ensure that safety-related electrical components would not fail during the allowable time duration of a degraded voltage condition (in accordance with NRC Multi-Plant Action B-23, Position 1.C) was a performance deficiency. The finding was determined to be more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences. Specifically, the failure to ensure that the protective devices for the loads required at the beginning of a Loss of Control Accident would not fail under degraded voltage conditions did not ensure that these loads would be available to perform their mitigating functions. In accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the issue screened as having very low safety significance (Green) because it was a design or qualification deficiency that did not represent a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; did not result in the loss of one or more trains of non-technical specification equipment; and did not screen as potentially risk-significant due to seismic, flooding, or severe weather. The team determined that this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance.

Inspection Report# : 2016008 (*pdf*)

Significance: N/A Dec 02, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Readiness to Cope with External Flooding

The team identified three examples of a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," which states, in part that, activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances. Specifically, prior to December 2, 2016, Unit 1 Operating Procedure OP 1203.025, "Natural Emergencies," Revision 60 and Unit 2 Operating Procedure OP 2203.008 "Natural Emergencies," Revision 42 failed to ensure all actions required to establish external flood protection, as specified by flood protection design basis engineering report CALC-ANOC-CS-00003, Revision 00 were implemented. This issue was entered into the licensee's corrective action program as Condition Report CR-ANO-2-2016-4265.

The licensee's failure to prescribe procedures appropriate to the circumstances for combating emergencies or other significant acts of nature such as flooding was a performance deficiency. The performance deficiency was more than minor because it was associated with the procedure quality attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of mitigating systems to respond to initiating events to prevent undesirable consequences, and would have the potential to lead to a more significant safety concern. In

accordance with Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 2, "Mitigating Systems Screening Questions," the issue screened as having very low safety significance (Green) because it does not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic, flooding, or severe weather initiating event. This finding had a cross-cutting aspect in the area of problem identification and resolution associated with identification because the licensee failed to identify issues, completely, accurately, and in a timely manner in accordance with the corrective action program. Specifically, the licensee failed to identify these deficiencies during a review of these same procedures as part of actions to close significant performance deficiencies as documented in Arkansas Nuclear One Area Action Plan FP-6.

Inspection Report# : 2016008 (*pdf*)

Significance: Y Aug 01, 2014

Identified By: NRC

Item Type: VIO Violation

Inadequate Flood Protection for Auxiliary and Emergency Diesel Fuel Storage Buildings

The inspectors identified a finding of preliminary substantial safety significance (Yellow) for the failure to design, construct, and maintain the Units 1 and 2 auxiliary and emergency diesel fuel storage buildings in accordance with the safety analysis reports' description of internal and external flood barriers so that they could protect safety-related equipment from flooding. Two apparent violations were associated with this finding:

- a. Contrary to 10 CFR Part 50, Appendix B, Criterion III, "Design Control," the licensee failed to assure that regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions, and that design changes were subjected to design control measures commensurate with those applied to the original design.
- b. Contrary to 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," the licensee failed to prescribe documented instructions for activities affecting quality and accomplish activities affecting quality in accordance with drawings.

The licensee entered these issues into the corrective action program as Condition Reports CR-ANO-C-2013-01304 and CR-ANO-C-2014-00259. The licensee resolved the safety concern by replacing the degraded seals or parts, installing penetration seals, implementing compensatory measures, and/or incorporating instructions into procedures.

The inspectors determined that the finding was more than minor because it was associated with the protection against external factors attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the performance deficiency resulted in the vulnerability to flooding of safety-related equipment necessary to maintain core cooling in the auxiliary and emergency diesel fuel storage buildings. The inspectors used Inspection Manual Chapter 0609, Attachment 0609.04, "Initial Characterization of Findings," dated June 19, 2012, and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, to evaluate the significance of the finding. In accordance with Appendix A, Exhibit 4, the inspectors determined that a detailed risk evaluation was necessary because, if the flood barriers were assumed to be completely failed, two or more trains of a multi-train system would be degraded during an external flood.

The NRC risk analysts determined that the finding should be evaluated in accordance with NRC Inspection Manual Chapter 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria," April 12, 2012.

Appropriate quantitative significance determination process tools did not exist to provide a reasonable estimate of the significance because a plant-specific flood hazard analysis did not exist and was not expected to be available until sometime in 2015. The risk analysts used NRC Inspection Manual Chapter 0609, Appendix M, Table 4.1, "Qualitative Decision-Making Attributes for NRC Management Review," to determine the preliminary safety significance of the finding. The following were the dominant considerations in reaching a preliminary risk determination conclusion:

1. With respect to the auxiliary and emergency diesel fuel storage buildings, there were more than 100 unknown ingress pathways for a flooding event, therefore if an external flood above grade level were to occur, the buildings would flood.
2. The unexpected rate of flooding would likely be beyond the licensee's capability to prevent or mitigate as equipment and connections associated with alternative mitigating strategies, could be submerged.
3. All reactor core cooling and makeup could fail due to significant flooding of the auxiliary and emergency diesel fuel storage buildings.
4. The change in core damage frequency was quantitatively bounded below 2×10^{-3} and qualitatively determined to likely be less than 1×10^{-4} . The bounding and qualitative results are based on the frequency of the probable maximum flood event and a loss of all equipment needed for core cooling and makeup.

This finding was preliminarily determined to be of substantial safety significance (Yellow) for Unit 1 and Unit 2, as determined by a Significance and Enforcement Review Panel.

This finding had a cross-cutting aspect in the area of human performance related to maintaining design margins. Specifically, the licensee did not design, construct, and/or maintain over 100 flood barriers to ensure design margins were sustained.

The finding was determined to be Yellow (substantial safety significance) for both Units. Final significance determination and NOV issued January 22, 2015 (IR 05000313;638/2014010) (ML15023A076).

Inspection Report# : 2014010 (*pdf*)

Inspection Report# : 2016008 (*pdf*)

Inspection Report# : 2016007 (*pdf*)

Inspection Report# : 2014009 (*pdf*)

Barrier Integrity

Significance:  Dec 31, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Perform Walkdown in Controlled Manner

The inspectors documented a self-revealed finding and associated non-cited violation of Unit 1 Technical Specification 5.4.1.a, for the failure to properly pre-plan and perform a pre-modification walkdown in the Unit 1 train A safety-related switchgear room so that the walkdown would not adversely affect the performance of train. As a result, licensee personnel inadvertently de-energized the A3 switchgear and associated ac buses, which resulted in the loss of one train of spent fuel pool cooling. Operators restored spent fuel pool cooling, the licensee evaluated the human error and performed a training stand-down to ensure pre-job walkdowns did not impact plant equipment. The licensee entered this issue into the corrective action program as Condition Report CR-ANO-1-2016-04356.

The failure to perform a plant walkdown in a manner that did not impact safety-related switchgear is a performance deficiency. The performance deficiency is more than minor because it adversely affected the human performance

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. Specifically, de-energizing the safety-related switchgear resulted in the loss of one train of spent fuel pool cooling and an increase in risk level from Green to Yellow. The inspectors evaluated the finding with NRC Manual Chapter 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, Exhibit 3, "Barrier Integrity Screening Questions," because the appendix provides the most applicable guidance, regardless of whether the unit was at-power or shutdown. The inspectors determined that the finding screened as having very low safety significance (Green) because the finding did not cause the spent fuel pool to exceed the maximum analyzed temperature, did not damage fuel cladding, did not result in a loss pool water inventory below the minimum analyzed level, and did not affect the pool neutron absorber or soluble boron concentration. The inspectors determined this finding has a cross-cutting aspect in the human performance area of Avoid Complacency, because the primary cause of the performance deficiency involved the failure to plan for the possibility of mistakes and use appropriate error reduction tools.

Inspection Report# : 2016004 (*pdf*)

Emergency Preparedness

Occupational Radiation Safety

Public Radiation Safety

Security

The security cornerstone is an important component of the ROP, which includes various security inspection activities the NRC uses to verify licensee compliance with Commission regulations and thus ensure public health and safety. The Commission determined in the staff requirements memorandum (SRM) for SECY-04-0191, "Withholding Sensitive Unclassified Information Concerning Nuclear Power Reactors from Public Disclosure," dated November 9, 2004, that specific information related to findings and performance indicators associated with the security cornerstone will not be publicly available to ensure that security-related information is not provided to a possible adversary. Security inspection report cover letters will be available on the NRC Web site; however, security-related information on the details of inspection finding(s) will not be displayed.

Miscellaneous

Current data as of : August 03, 2017

Page Last Reviewed/Updated Wednesday, August 10, 2016