

Arkansas Nuclear 1

1Q/2012 Plant Inspection Findings

Initiating Events

Mitigating Systems

Significance:  Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Exceeded Technical Specification Allowed Outage Time for Electrical Power Systems

The inspectors identified a noncited violation of Unit 1 Technical Specification 3.8.4, “DC Sources-Operating,” Technical Specification 3.8.7, “Inverters- Operating,” and Technical Specification 3.8.9, “Distribution Systems-Operating,” due to the licensee’s failure to complete the associated required action prior to the specified completion time while the associated emergency switchgear room chillers were out of service for planned maintenance. The licensee immediately implemented corrective actions to direct Operations to enter the applicable technical specifications and notify ANO management. The issue was identified to the licensee and entered into their corrective action program as Condition Report CR-ANO-1-2012-0043.

The inspectors determined that not completing the required actions for the applicable technical specifications prior to the specified completion time while the associated emergency switchgear room chillers were out of service for planned maintenance is a performance deficiency. The performance deficiency is determined to be more than minor because it is associated with the equipment performance attribute of the Mitigating Systems Cornerstone, and adversely affects the associated cornerstone objective to ensure availability, reliability, and the capability of systems that respond to initiating events to prevent undesirable consequences and is therefore a finding. Specifically, on December 7, 2011, the failure to complete the required actions prior to the specified completion times for Technical Specification 3.8.4, “DC Sources – Operating,” Technical Specification 3.8.7, “Inverters – Operating, and Technical Specification 3.8.9, “ Distribution Systems – Operating,” after removing the VCH-4A from service for maintenance was a violation of technical specifications. Additionally, on December 19, 2011, the failure to complete the required actions prior to the specified completion time for Technical Specification 3.8.7, “Inverters – Operating,” after removing the VCH-4B from service for maintenance, was a violation of technical specifications. Using Inspection Manual Chapter 0609.04, “Phase 1 – Initial Screening and Characterization of Findings,” the finding was determined to require a Phase 2 analysis because removing each VCH-4 chiller from service in December 2011 did result in an actual loss of safety function of a single train for greater than its technical specification allowed completion time. A phase 2 analysis from a previous noncited violation that bounds this issue determined the finding to be of very low safety significance (Green). Specifically, although the function was lost by the designated support equipment (emergency switchgear chillers), the licensee had an evaluation that credited compensatory measures and specific environmental conditions that assured the overall functionality of the applicable switchgear train was not lost. The finding was determined to have a cross-cutting aspect in the area of human performance, associated with the decision making component, in that the licensee did not use conservative assumptions in decision making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement that it is unsafe in order to disapprove the action.

Inspection Report# : [2011005](#) (pdf)

Significance:  Dec 31, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Identify and Correct Unit 1 Service Water Pump Column Protective Wrap Installation Deficiencies

The inspectors documented a self-revealing, noncited violation of 10 CFR 50 Appendix B, Criterion XVI, “Corrective Action,” for the licensee’s failure to promptly identify and correct a condition adverse to quality associated with degradation of the protective wrap (brand name – Denso) installed on the Unit 1 service water pump columns. The Denso protective wrap around the P-4C service water pump suction column became unraveled and was drawn into the pump suction while running and caused high differential pressure across the pump discharge strainer. The licensee took immediate corrective action to secure the pump and then removed the Denso protective wrap from all pump columns in the Unit 1 service water intake structure bays. Unit 2 does not have Denso protective wrap installed on their service water pumps. The licensee has entered this issue into their corrective action program as Condition Report CR-ANO-1-2011-2843.

The failure to promptly identify and correct the observed degradation of the protective wrap installed on the Unit 1 service water pump columns is determined to be a performance deficiency. The performance deficiency is determined to be more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affects the cornerstone objective to ensure availability, reliability, and the capability of systems that respond to initiating events to prevent undesirable consequences and is therefore a finding. The inspectors performed the significance determination for the failure of service water pump 4C using NRC Inspection Manual Chapter 0609, Attachment 0609.04, “Phase 1 – Initial Screening and Characterization of Findings.” The problem had occurred during an outage, but it could have occurred at power during a system realignment. The at-power model was more conservative, so it was used to evaluate the finding. Service water was a two train system with a swing pump (an installed spare). The allowed outage time for one train was 72 hours. Operators could easily align the swing pump to provide the train B service water loads within 72 hours. Therefore, this finding screened to Green because: 1) it was not a design or qualification deficiency; 2) it did not result in loss of safety function of one train of equipment for more than its technical specification allowed outage time; 3) It did not result in a loss of one train of non-technical specification equipment; and 4) it did not screen as potentially risk significant due to an external event. The finding was determined to have a cross-cutting aspect in the area of problem identification and resolution, associated with the corrective action program component in that the licensee failed to thoroughly evaluate the degraded protective wrap such that the resolutions addressed causes and extent of conditions, to include operability of the service water pump.

Inspection Report# : [2011005](#) (pdf)

Significance:  Dec 31, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Adequately Implement the Configuration Control Program

The inspectors documented a self revealing, noncited violation of Unit 1 Technical Specification 5.4.1.a for the failure to implement station procedure OP-1015.049 “Configuration Control Program”, Revision 1. Specifically, on multiple occasions, station personnel failed to maintain configuration control through the use of valve line-ups and station procedures to ensure reactor plant components were in required positions. In each specific example the licensee took action to place the applicable system in a safe configuration. The licensee is implementing long term programmatic corrective actions. The licensee has placed that issue into their corrective action program as Condition Report CR-ANO-C-2011-2942.

The failure of station personnel to maintain configuration control through the use of valve line-ups and governing station procedures is a performance deficiency. The performance deficiency is more than minor because it is associated with the configuration control attribute of the Mitigating Systems cornerstone and adversely affects 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. Using Manual Chapter 0609.04, “Phase 1 - Initial Screening and Characterization of Findings,” the examples included an actual loss of safety function of a non-technical specification train of equipment designated as risk-significant per 10CFR50.65, for greater than 24 hours. A Phase 3 significance determination analysis was performed by a Region IV senior reactor analyst. The dominant core damage sequences for Unit 1 were station blackouts with battery depletion and transients with loss of feedwater and feed and bleed capability. The dominant core damage sequences for Unit 2 were station blackout with loss of emergency feedwater and once-through-cooling, loss of 4160 volt vital bus 2A4 with loss of feedwater and once-through-cooling, and station blackout with an 8-hour battery depletion. Based on both units having the capability to operate a steam driven emergency feedwater pump during the dominate core damage sequences the finding was determined to have very low safety significance (Green). The finding was determined to have a cross-cutting aspect in

the area of human performance, associated with the work practices component in that the licensee failed to define and effectively communicate expectations regarding procedural guidance and personnel follow procedures when performing component positioning.

Inspection Report# : [2011005](#) (*pdf*)

Significance:  Sep 30, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Verify the Adequacy of Design of Unit 1 Emergency Core Cooling Systems to Address Potential Voiding

The inspector identified a noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program.

Specifically, the licensee identified potential void locations during engineering evaluations of the Unit 1 High Pressure Injection, Decay Heat Removal / Low Pressure Injection, Core Flood, and Building Spray systems and did not verify the adequacy of the design of those systems to ensure continued operability. The licensee performed ultrasonic testing on these locations at the time of the identification, but did not install vents, determine an acceptable void size, or establish a program to periodically vent or monitor these locations. The licensee entered this issue into their corrective action program as Condition Report CR-ANO-1-2011-1406.

The failure to verify and check the adequacy of design of the Unit 1 High Pressure Injection, Decay Heat Removal/Low Pressure Injection, Core Flood, and Building Spray systems is a performance deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and adversely affected the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. This finding has a crosscutting aspect in the area of problem identification and resolution in the corrective action component because the licensee did not takes appropriate corrective actions to address safety issues in a timely manner. [P.1.d].

Inspection Report# : [2011004](#) (*pdf*)

Significance:  Sep 30, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Identify the Decay Heat Removal Coolers as Potential Void Locations

The inspector identified a noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program.

Specifically, when performing a design review, the licensee did not identify the Decay Heat Removal coolers as locations where gas could accumulate in the Decay Heat Removal system and establish methods to verify the adequacy of design to ensure operability. The licensee performed immediate inspection of the heat exchangers by ultrasonic testing and did not find any voids. The licensee entered this issue into their corrective action program as Condition Report CR-ANO-1-2011-01306.

The failure to identify the Decay Heat Removal heat exchangers as locations where gas could accumulate is a performance deficiency. The performance deficiency is more than minor because if uncorrected, it could lead to a more significant safety concern. Specifically, the licensee could be unaware of an unanalyzed void in the Decay Heat Removal system because they failed to consider the potential for gas accumulation and had no program in place to detect it. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. This finding has a crosscutting aspect in the area of human performance in the decision making component because the licensee did not use conservative assumptions in decision making or conduct effectiveness reviews of safety-significant decisions to verify the validity of the underlying assumptions [H.1.b].

Inspection Report# : [2011004](#) (*pdf*)

Significance: G Sep 30, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Adequately Evaluate the Required Minimum Level in the Borated Water Storage Tank

The inspectors identified a noncited violation of 10 CFR 50 Appendix B Criterion III for failure to verify and check the adequacy of design by performance of design reviews, alternate calculations, or a suitable testing program. Specifically, the licensee did not adequately evaluate the required minimum level in the Borated Water Storage Tank to ensure adequate net positive suction head for Emergency Core Cooling System pumps and prevent gas entrainment due to vortex formation. The licensee performed an immediate operability evaluation and concluded that there was sufficient margin in the level to maintain operability. The licensee entered this issue into their corrective action program as Condition Report CR-ANO-1-2011-1407 and CR-ANO-1-2011-1440.

The failure to adequately evaluate the minimum level in the Borated Water Storage Tanks to ensure adequate net positive suction head for Emergency Core Cooling System pumps and prevent vortex formation is a performance deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating Systems cornerstone and adversely affects the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee did not adequately ensure that the design of the Borated Water Storage Tank was sufficient to avoid loss of net positive suction head and prevent air entrainment in the Emergency Core Cooling System pumps. The inspector performed a Phase 1 screening, in accordance with Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of very low safety significance (Green), because the finding was confirmed not to result in a loss of operability. The finding was determined to have no cross-cutting aspect because the performance deficiency occurred in 2004, and is not indicative of current plant performance.

Inspection Report# : [2011004](#) (*pdf*)

Significance: G Jun 03, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Follow Compliance Work Order for Corrective Maintenance on Safety Related Equipment

The inspectors identified a Green noncited violation of Unit 1 Technical Specification 5.4.1.a for a failure to perform proper placekeeping in a compliance work order for the replacement of the auto-manual pushbutton, PB-2613, emergency feedwater steam admission valve. Specifically, the instrumentation and controls technician had completed critical steps in a compliance work order without following the work order as written as required in section 5.15 of station procedure, EN-MA-101, Fundamentals of Maintenance," Revision 9. The licensee took immediate corrective action to restore compliance. This issue has been entered into the corrective action program as Condition Reports CR-ANO-C-2011-0284, CR-ANO-C-1695, and CR-ANO-C-2011-1673.

The inspectors determined that the failure to follow the compliance work order as required by station procedure EN-MA-101, "Fundamentals of Maintenance," Revision 9, was a performance deficiency because it was within the licensee's ability to foresee and correct and is also a violation of technical specifications. The performance deficiency was determined to be more than minor because it was associated with the human performance attribute of the Mitigating System Cornerstone and adversely affected the cornerstone objective to ensure availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences and is therefore a finding. Specifically, not following compliance work orders while working on safety related equipment could adversely affect the system or component if required to respond to an event. Using MC 0609, Exhibit 1, "Phase 1 Initial Screening and Characterization of Findings," the finding was determined to be green because it did not result in the loss of operability or functionality; did not represent a loss of system safety function; did not represent an actual loss of function of a single train for greater than its technical specification allowed outage time; did not represent an actual loss of safety function of any risk significant system for greater than 24 hours; and did not screen as potentially risk significant due to external events. The finding was determined to have a crosscutting aspect in the area of human performance, associated with work practices in that the licensee failed to use human error prevention techniques, such as self and peer checks, and questioning attitude, to ensure that the compliance work order was being followed step-by-step as required, [H.4(a)]

Barrier Integrity

Significance:  Dec 31, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Implement Procedure Results in Lowering Spent Fuel Pool Level by 0.6 feet

The inspectors documented a self-revealing, non-cited violation of Unit 1 Technical Specification 5.4.1.a for the failure to implement station procedure OP 1104.006 “Spent Fuel Cooling System”, Revision 51. Specifically, SF-10, flow control to purification loop valve, was found 3 turns open when it was required to be closed. This resulted in the spent fuel pool level lowering by 0.6 feet, which was below procedural limits, when the fuel transfer canal was placed in purification and SF-45, transfer tube isolation valve, was closed to support diving operations in the Unit 1 spent fuel pool tilt pit. After receiving the spent fuel pool low level alarm, operations personnel secured purification, and opened SF-45 which allowed water level to return to normal. Additional actions taken by the licensee included identifying that SF-10 requires a torque amplifying device to operate. The issue was entered into the licensee’s corrective action program as Condition Report CR-ANO-1-2011-2498.

The failure of operations personnel to implement the requirements of procedure OP 1104.006 and close SF-10 prior to initiating fuel transfer canal on purification, which resulted in an unexpected loss of approximately 4500 gallons of water from the spent fuel pool, is a performance deficiency. The performance deficiency is more than minor because it is associated with the configuration control attribute of the Barrier Integrity cornerstone and adversely affects 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. Using Manual Chapter 0609.04, “Phase 1 - Initial Screening and Characterization of Findings,” the finding was determined to have very low safety significance (Green) because the finding did not result in the loss of spent fuel cooling, did not result from fuel handling errors that caused damage to the fuel clad integrity or a dropped assembly and did not result in a loss of spent fuel inventory of greater than 10 percent of the spent fuel pool volume. The finding was determined to have a cross-cutting aspect in the area of human performance, associated with the work control component in that the licensee failed to ensure that work activities were appropriately coordinated to support long term equipment reliability by limiting operator work-arounds when a torque amplifying device was required to shut SF-10.

Inspection Report# : [2011005](#) (pdf)

Significance:  Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Identify and Correct a Condition Adverse to Quality Resulted in Dropping a Fuel Bundle Approximately One Inch

The inspectors identified a noncited violation of 10 CFR 50, Appendix B, Criterion XVI for failure to identify and correct a condition adverse to quality. Specifically, on November 1, 2011, the licensee failed to identify and correct a condition associated with seating an irradiated fuel bundle into a reactor building storage location during core re-loading activities. The licensee failed to thoroughly evaluate a discrepancy associated with an unexpected vertical measurement when inserting an irradiated fuel bundle prior to unlatching the fuel bundle. This resulted in the bundle dropping 1 1/8 inches when the licensee attempted to retrieve it. After the bundle dropped, the licensee immediately performed a visual inspection and, with vendor analysis support, removed the bundle from service. The licensee entered this issue into the corrective action program as Condition Report CR-ANO-1-2012-0110.

The failure to identify and correct the discrepancy in the vertical position of an irradiated fuel bundle during fuel handling operations is a performance deficiency. The performance deficiency is determined to be more than minor because it is associated with the human performance attribute of the Barrier Integrity cornerstone and adversely affects the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the performance deficiency resulted in a dropped

fuel bundle that was subsequently removed from service due to possible fuel pellet damage. The event also took place while the reactor building was open to the atmosphere. Using Manual Chapter 0609, Appendix G, Attachment 1, Checklist 4, "PWR Refueling Operation: RCS Level >23'," the finding was determined to have very low safety significance (Green) because the finding did not adversely affect: 1) core heat removal, 2) inventory control, 3) electrical power, 4) containment control, or 5) reactivity control. The finding was determined to have a cross-cutting aspect in the area of human performance, associated with decision making component in that the licensee failed to use conservative assumptions and adopt a requirement to demonstrate that the proposed action is safe in order to proceed when deciding to accept the discrepancy in the vertical measurement when storing a fuel bundle in the reactor building storage rack.

Inspection Report# : [2011005](#) (pdf)

Significance:  Dec 31, 2011

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Take Adequate Corrective Actions for Known Fuel Transfer System Deficiencies

The inspectors documented a self-revealing finding for the failure to take adequate corrective actions for known deficiencies associated with the Unit 1 fuel transfer system. Specifically, the licensee failed to investigate and correct issues that had been identified by site and vendor personnel from 1996 through 2010. This led to repeated fuel transfer system failures and significant core offload and reload delays during the 1R23 refueling outage, which placed the plant in an unplanned configuration for an extended period of time. After the failure of the fuel transfer equipment, multiple corrective actions were performed which included the installation of a temporary modification which allowed fuel movement to continue to support core reloading. The issue was entered into the licensee's corrective action program as Condition Report CR-ANO-1-2011-2558.

The failure of the licensee to take effective corrective action for known deficiencies related to the Unit 1 fuel transfer system is determined to be a performance deficiency. The performance deficiency is determined to be more than minor because, if left uncorrected, the performance deficiency could become a more safety significant issue. Specifically, the continued failure of the licensee to correct known deficiencies in the fuel transfer system could lead to damage to a fuel bundle. Using Manual Chapter 0609, Appendix G, Attachment 1, Checklist 4, "PWR Refueling Operation: RCS Level >23'," the finding was determined to have very low safety significance (Green) because the finding did not adversely affect: 1) core heat removal, 2) inventory control, 3) electrical power, 4) containment control, or 5) reactivity control. The finding was determined to have a cross-cutting aspect in the area of human performance, associated with decision making component in that the licensee failed to use conservative assumptions and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate that it is unsafe in order to disapprove the action. Specifically, the decision making efforts affecting the fuel transfer system did not reflect a safety minded culture as past experience and vendor recommendations were disregarded.

Inspection Report# : [2011005](#) (pdf)

Emergency Preparedness

Occupational Radiation Safety

Public Radiation Safety

Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

Miscellaneous

Last modified : May 29, 2012