

## Arkansas Nuclear 2

### 4Q/2015 Plant Inspection Findings

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## Initiating Events

**Significance:** G Dec 31, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Failure to Assess Risk for Switchyard Work**

The inspectors identified a non-cited violation of 10 CFR 50.65(a)(4), “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” for failure to assess the risk impact of switchyard maintenance. Specifically, the station failed to properly classify some switchyard work and assess risk as specified in Procedure COPD-024, “Risk Assessment Guidelines,” Revision 055 during multiple periods of switchyard work between October 2 and 15, 2015. The work involved the repair of damaged conduit on the voltage regulators, transformer refurbishment, relay calibrations, and motor operated disconnect replacement. For immediate corrective actions, each operations shift manager provided training to their crews to ensure they were familiar with required station risk updates. This issue was entered into the licensee’s corrective action program as Condition Report CR-ANO-C-2015-04147.

The failure to assess the increase in risk due to switchyard maintenance is a performance deficiency. The finding is more than minor because it adversely affected the protection against external factors attribute of the Initiating Event cornerstone to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the licensee failed to evaluate the potential impact of maintenance in the switchyard which could result in plant upsets or transients. Because the finding affects the licensee’s assessment of risk associated with performing maintenance activities, NRC Manual Chapter 0609, Attachment 4, “Initial Characterization of Findings,” directs significance determination via the use of NRC Manual Chapter 0609, Appendix K, “Maintenance Risk Assessment and Risk Management Significance Determination Process,” dated May 19, 2005. A regional senior reactor analyst screened the change in core damage frequency to be  $<1E-6$  for Unit 1 and calculated the change in core damage frequency to be  $1.5E-7$  for Unit 2. In accordance with Flowchart 1 of Appendix K, the significance of this finding was determined to be of very low safety significance (Green), because the calculated Incremental Core Damage Probability Deficits for both units were not greater than  $1.0E-6$ . The inspectors determined this finding has a cross-cutting aspect in the area of Consistent Process, because the primary cause of the performance deficiency involved the failure to use a consistent, systematic approach to manage work decisions in the switchyard [H.13]. (Section 1R13)

Inspection Report# : [2015004](#) (*pdf*)

**Significance:** G Jun 30, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Inadequate Procedure for Severe Weather Preparation**

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, & Drawings,” for the failure to establish appropriate procedures for preparations for severe weather. Specifically, inspectors observed that the licensee failed to ensure that all outside areas were inspected in order to secure material prior to severe weather, to reduce the probability of light material missile damage on plant equipment. The licensee concluded that the assignment of responsibilities was unclear in Procedure EN-FAP-EP-010, “Severe Weather

Response,” Revision 1, leading to confusion among the two operating crews. This issue was entered into the licensee’s corrective action program as Condition Reports CR-ANO-C-2015-00854 and CR-ANO-C-2015-00859.

The failure to have a procedure to ensure that all outside areas would be inspected in order to secure loose material prior to the arrival of severe weather, to reduce the probability of light material missile damage on plant equipment was a performance deficiency. The performance deficiency was more than minor because it was associated with the procedure quality 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, during severe weather, unsecured material could become a missile that impacts equipment and upsets plant stability. Using NRC Inspection Manual Chapter 0609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” the inspectors determined that the finding had very low safety significance (Green) because it did not represent an actual reactor trip and the loss of mitigation equipment. This finding has a human performance crosscutting aspect associated with work management, in that the organization failed to implement a process of planning, controlling, and executing work activities, including coordination with different groups or job activities. Specifically, only one crew performed the required inspections when severe weather had been forecast since the procedure in use did not clearly assign responsibilities to both operating crews [H.5].

Inspection Report# : [2015002](#) (*pdf*)

**Significance:**  Jun 30, 2015

Identified By: Self-Revealing

Item Type: FIN Finding

**Failure to Verify Material Properties Prior to Installation**

The inspectors reviewed a self-revealing finding involving failure to verify that the proper material was installed in the plant during initial construction of the Unit 2 reactor coolant system (RCS) sample system. Specifically, failure to use the correct material resulted in two through-wall leaks in the supply line to the 2E30 cooler for the RCS sample system. The licensee removed the components with the incorrect material and installed components of the correct material. This issue was entered into the licensee’s corrective action program as Condition Report CR-ANO-C-2014-01800.

The failure to verify the correct materials were installed in the plant is a performance deficiency. This performance deficiency is more than minor because it is associated with the equipment performance attribute of the Initiating Events Cornerstone and affects the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as during power operations. Specifically, failure to install the correct material resulted in failure of the RCS sample system and the inability to meet technical specification requirements for determining dose equivalent Xenon-133. Using NRC Inspection Manual Chapter 0609, Appendix A, Exhibit 1, “Initiating Event Screening Questions,” the inspectors determined the finding is of very low safety significance (Green) because the transient initiator did not cause a reactor trip and the loss of mitigating equipment. This finding has not been assigned a cross cutting aspect because the incorrect material was installed during initial construction, and is not indicative of current plant performance.

Inspection Report# : [2015002](#) (*pdf*)

**Significance:**  May 15, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Properly Implement Procedures for Writing Procedures Important to Safety**

The team identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions,

Procedures, and Drawings,” involving the licensee’s failure to perform activities affecting quality as prescribed by documented procedures of a type appropriate to the circumstances and accomplished in accordance with these procedures. Specifically, the team identified the licensee failed to ensure procedures important to safety were written in accordance with Procedure EN-AD-101-01, “Nuclear Management Manual Procedure Writer Manual,” Revision 14.

The licensee’s failure to write procedures important to safety in accordance with Procedure EN-AD-101-01 was a performance deficiency. This finding was more than minor because it was associated with the procedure quality attribute of the Initiating Systems cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions. Specifically, the licensee did not adequately implement Procedure EN-AD-101-01 to ensure activities directing reactivity manipulations were accomplished in accordance with procedures of a type appropriate to the circumstances to prevent end-of-life axial-shape-index reactor trips. Using Inspection Manual Chapter 0609, Appendix A, the team determined that the finding was of very low safety significance (Green) because it did not cause the loss of mitigation equipment relied upon to transition the plant to a stable shutdown condition. This finding had a crosscutting aspect in the area of human performance associated with resources because leaders failed to ensure personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety (H.1).

Inspection Report# : [2015008](#) (*pdf*)

**Significance:** Y Feb 10, 2014

Identified By: NRC

Item Type: VIO Violation

**Unit 2 - Failure to Follow the Materials Handling Program during the Unit 1 Generator Stator Move**

Unit 2 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 this 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 caused a reactor trip on Unit 2 and damage to the fire main system which resulted in water intrusion into the electrical equipment causing a loss of startup transformer 3. This resulted in the loss of power to various loads, including reactor coolant pumps, instrument air compressors, and the safety-related Train B vital electrical bus. 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. Since this was an initiating event, the inspectors used Exhibit 1 of Appendix A and determined that Section C, “Support System Initiators,” was impacted because the finding involved the loss of an electrical bus and a loss of instrument air. The inspectors determined that Section E, “External Event Initiators,” of Exhibit 1 should also be applied because the finding impacted the frequency of internal flooding. Since Sections C and E were impacted, a detailed risk evaluation was required. The NRC risk analyst used the Arkansas Nuclear One, Unit 2 Standardized Plant Analysis Risk Model, Revision 8.21, and hand calculation methods to quantify the risk. The model was modified to include additional breakers and switching

options, and to provide credit for recovery of emergency diesel generators during transient sequences. Additionally, the analyst performed additional runs of the risk model to account for consequential loss of offsite power risks that were not modeled directly under the special initiator. The largest risk contributor (approximately 96 percent) was a loss of all feedwater to the steam generators, with a failure of once-through cooling. The result of the analysis was a conditional core damage probability of  $2.8E-5$ ; therefore, this finding was preliminarily determined to have substantial safety significance (Yellow).

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 Yellow 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# : [2013012](#) (*pdf*)

Inspection Report# : [2014008](#) (*pdf*)

## Mitigating Systems

**Significance:**  Dec 31, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Failure to Identify and Correct Rain Water Accumulation in the Emergency Diesel Generator System Exhausts**

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for failure to identify a condition adverse to quality. Specifically, the licensee failed to identify rain water accumulation in the exhaust systems for the Units 1 and 2 emergency diesel generators due to clogged water drains. As a result, rainwater in the exhaust piping may have caused the emergency diesel generators to exceed the seismic rating of the exhaust systems during a seismic event. The inspector identified that when ANO removed the rain shields in 1998, they planned to implement periodic drain line cleaning to avoid clogging, but never created the preventive maintenance item to implement the cleaning. In response, the licensee cleaned the drain lines, drained the exhaust pipes, and implemented preventative maintenance activities to periodically clean the drain lines. This issue was entered into the licensee's corrective action program as Condition Report CR-ANO-C-2015-04570.

The failure to identify that rainwater was accumulating in all four emergency diesel exhaust systems and could impact the availability of the system is a performance deficiency. The performance deficiency is more than minor because it affected the protection against external factors attribute of the Mitigating Systems Cornerstone objective 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, operators failed to recognize that drain lines were blocked during routine operations to drain the exhaust lines, which allowed rain water to accumulate that exceeded the allowed seismic loading of the piping. Using NRC Manual Chapter 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations," the inspectors determined that a detailed risk evaluation was required. A senior reactor analyst performed a detailed risk evaluation and determined that the increase in core damage frequency was  $1.3E-7$ /year (Green). The dominant risk was determined to involve seismically induced losses of offsite power. Emergency feedwater and a Unit 2 emergency diesel generator remained available to successfully avoid core damage. The inspectors determined this finding has a cross-cutting aspect in the area of Avoid

Complacency because the primary cause of the performance deficiency involved the failure to plan for or recognizing latent conditions involving clogged drain lines [H.12]. (Section 1R18)

Inspection Report# : [2015004](#) (*pdf*)

**Significance:** G Sep 30, 2015

Identified By: Self-Revealing

Item Type: NCV Non-Cited Violation

**Failure to Promptly Correct a Condition Adverse to Quality Involving Motor Control Center Bus Stabs**

Green. The inspectors reviewed a self-revealing violation of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” for the failure to correct conditions adverse to quality. Specifically, the licensee failed to promptly replace short bus stabs with longer bus stabs in six 480V safety-related motor control centers as planned following a 2007 motor control center fault. Subsequently, safety-related motor control centers remained susceptible to a fault because corrective actions had not been implemented. This issue was entered into the licensee’s corrective action program as Condition Report 2015-2661. The licensee has completed the modifications to all breakers except those requiring an outage.

The failure to promptly correct conditions adverse to quality associated with 480V breaker connections to bus bars was a performance deficiency. The performance deficiency is more than minor because it is associated with the equipment performance attribute of Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events. Specifically, untimely corrective actions allowed an increased likelihood of a fault to continue to exist that would result in the loss of the associated safety-related motor control centers if the fault occurred. Using NRC Inspection Manual Chapter 0609 Appendix A, “Significance Determination Process (SDP) for Findings At-Power,” the inspectors determined that the finding was of very low safety significance (Green) because the finding was not a deficiency affecting design or qualification, did not represent a loss of system and/or function, and did not represent an actual loss of function. This finding was not assigned a cross-cutting aspect because it was not indicative of current plant performance; the licensee decided to remove the corrective actions from the corrective action program more than 3 years ago.

Inspection Report# : [2015003](#) (*pdf*)

**Significance:** G Jun 30, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Protect Motor Control Center from Potential Pipe Spray**

The inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” for the failure to select and review equipment for suitability of application that is essential to the safety-related function of Unit 2 motor control center (MCC) 2B-52. Specifically, the licensee failed to ensure that the safety-related electrical equipment inside the MCC was adequately protected from water spray in the event of a failure of overhead non-seismic category 1 pipes, in accordance with the safety analysis report. Inspectors identified that the installed spray curtain only protected the front of the cabinet, while a cooling water pipe that could break during a seismic event was located directly above the length of the MCC. This issue was entered into the licensee’s corrective action program as Condition Report CR-ANO-C-2015-01342.

The failure to protect Unit 2 MCC 2B-52 from possible spray of overhead non-seismic category 1 pipes by installing a spray shield in accordance with the safety analysis report was a performance deficiency. The performance deficiency 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 of systems that respond to initiating events to prevent undesirable consequences. Specifically, the performance deficiency could result in failure of one train of essential safety features during a seismic event, such as exhaust fans for the emergency diesel generators, containment spray isolation valves, and high pressure safety injection isolation valves. Using NRC

Inspection Manual Chapter 0609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” the inspectors determined to require a detailed risk evaluation because the finding involved degradation of equipment specifically designed to mitigate a seismic event and could degrade one train of a system that supports a risk significant function. A senior reactor analyst performed the detailed risk evaluation and estimated the change to the core damage frequency was 3.8E-8/year (Green). The dominant core damage sequences included seismically induced losses of offsite power. This finding did not have a cross-cutting aspect associated with it because the most significant contributing cause was not indicative of present performance. Specifically, the condition had existed since plant construction, with no recent substantial opportunities to identify the issue.

Inspection Report# : [2015002](#) (pdf)

**Significance:** G Jun 30, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Perform Testing of Diesel Fuel Oil Transfer Piping**

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI, “Test Control,” for the licensee’s failure to establish and maintain an adequate testing program for the fuel oil transfer piping for Units 1 and 2. Specifically, the licensee did not establish inservice testing to detect degradation of the fuel oil piping between the fuel oil storage tanks and the emergency diesel generator day tanks. This issue was entered into the licensee’s corrective action program as Condition Report CR-ANO-2-2015-01092.

The failure to perform the required testing of the fuel oil piping is a performance deficiency. The performance deficiency is more than minor because it is associated with the protection against external factors attribute of the Mitigating Systems Cornerstone, and affects the cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequence. Specifically, the licensee failed to perform examinations required to provide reasonable assurance that the piping could perform its intended function during design basis seismic events, and therefore maintain the ability to supply fuel to the emergency diesel generators. Using NRC Inspection Manual Chapter 0609, Appendix A, Exhibit 2, “Mitigating Systems,” the inspectors determined the finding is of very low safety significance (Green) because the finding did not involve the loss or degradation of equipment or function specifically designed to mitigate a seismic initiating event. The finding has a cross-cutting aspect in the area of human performance, associated with conservative bias, because the licensee did not use decision-making practices that emphasized prudent choices over those that were simply allowable. Specifically, during the buried piping initiative inspections that were completed in August 2013, the licensee failed to identify that the condition of the safety-related piping had never been evaluated and was being treated as a run to failure component [H.14].

Inspection Report# : [2015002](#) (pdf)

**Significance:** G May 15, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Correct Containment Spray Pump Interlock to Shutdown Cooling Heat Exchanger Room Coolers**

The team identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” for the licensee’s failure to correct a condition adverse to quality. Specifically, the licensee failed to correct the containment spray pump interlock to automatically start the shutdown cooling heat exchanger room coolers.

The licensee’s failure to promptly correct a condition adverse to quality as required by 10 CFR Part 50, Appendix B, Criterion XVI, was a performance deficiency. The licensee has identified in multiple instances since 1989 a degraded

or nonconforming condition with shutdown cooling heat exchanger room cooler interlocks, but has failed to correct the condition. This finding was more than minor because it was associated with the design control and equipment performance attributes of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to events to prevent undesirable consequences. Specifically, the licensee failed to correct the interlock feature that automatically starts the room coolers when the pump starts. Using Inspection Manual Chapter 0609, Appendix A, the team determined that the finding was of very low safety significance (Green) because it did not result in the loss of operability or functionality of any system or train and did not screen as risk-significant in response to external events. This finding had a cross-cutting aspect in the area of problem identification and resolution associated with evaluation because the licensee failed to thoroughly evaluate the issue to ensure that the resolution addressed the cause (P.2).

Inspection Report# : [2015008](#) (*pdf*)

**Significance:**  May 15, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

#### **Inadequate Extent of Condition Review for Risk-Significant Condition**

The team identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” that occurred because the licensee’s extent of condition performed in the root cause evaluation for the Yellow flooding finding failed to identify all potential water ingress paths into watertight rooms in the auxiliary building. The licensee identified additional examples of failures to construct the Unit 2 auxiliary building in accordance with the updated final safety analysis reports’ description of internal and external flood barriers so that they could protect safety-related equipment from flooding. The team identified that the licensee had an opportunity to identify the unsealed conduit during a series of flooding reviews and walk-downs between 2012 and 2014, including an extent of condition review for unsealed conduits.

Failure to identify and correct a condition adverse to quality as required by 10 CFR Part 50, Appendix B, Criterion XVI, and Procedure EN-LI-102 was a performance deficiency. This performance deficiency was more than minor because if left uncorrected, it could become a more significant safety concern. Specifically, the continued failure to identify all unsealed flooding penetrations could result in continued exposure of risk-significant equipment in the auxiliary building to flooding. This finding was associated with the Mitigating Systems cornerstone. Using Inspection Manual Chapter 0609, Appendix A, the team determined that the finding was of very low safety significance (Green) because it did not result in the loss of operability or functionality of any system or train and did not screen as risk-significant in response to external events. This finding has a human performance cross cutting aspect associated with teamwork, in that the licensee failed to communicate and coordinate their activities within and across organization boundaries to ensure that nuclear safety was maintained (H.4).

Inspection Report# : [2015008](#) (*pdf*)

**Significance:**  May 15, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

#### **Failure to Promptly Identify and Correct Breaker Auxiliary Switch Binding**

The team identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” for the failure to promptly identify and correct a condition adverse to quality. Specifically, the licensee failed to promptly correct a design deficiency with breaker auxiliary contact switches that resulted in binding and could result in incorrect interlock signals to other equipment.

The licensee’s failure to promptly identify a condition adverse to quality as required by 10 CFR Part 50, Appendix B, Criterion XVI, was a performance deficiency. The licensee failed to promptly correct a design deficiency with breaker auxiliary contact switches that resulted in binding and failed breaker interlocks. The performance deficiency was more

than minor, and therefore a finding, 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. Specifically, the untimely corrective actions have reduced the reliability of breaker interlocks, which may cause bus lockouts or safety equipment that could fail to automatically start. Using Inspection Manual Chapter 0609, Appendix A, the team determined that the finding was of very low safety significance (Green) because it did not result in the loss of operability or functionality of any system or train and did not screen as risk-significant in response to external events. The licensee has taken corrective actions to lessen the probability of bound switches by aligning shafts and lubricating bearing surfaces. This finding has a human performance cross-cutting aspect associated with consistent process in that the licensee failed to use risk insights in a systematic approach to make decisions (H.13).

Inspection Report# : [2015008](#) (pdf)

**Significance:**  May 15, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Identify, Document, and Mitigate Risk from Long Term Deficient Conditions**

The team identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to identify, document, and mitigate risk from long-term deficient conditions, as required by the Procedure EN-LI-102, "Corrective Action Program," Revision 24.

The failure to identify, document, and mitigate risk from long-term deficient conditions, as required by Procedure EN-LI-102, was a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, the delayed corrective actions and unmitigated deficiencies could reduce the reliability of the Unit 2 emergency diesel generator A, alternate ac diesel generator, and Unit 2 non-vital switchgear. This finding is associated with the Mitigating Systems cornerstone. Using Inspection Manual Chapter 0609, Appendix A, the team determined that the finding was of very low safety significance (Green) because it did not result in the loss of operability or functionality of any system or train and did not screen as risk-significant in response to external events. This finding has a human performance cross-cutting aspect associated with conservative bias in that the licensee failed to use decision-making practices that emphasize prudent choices over those that are simply allowable and failed to determine that a proposed action was safe in order to proceed, rather than unsafe in order to stop (H.14).

Inspection Report# : [2015008](#) (pdf)

**Significance:**  Mar 31, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Protect Safety Equipment From Potential High Energy Line Breaks**

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to assure that applicable regulatory requirements and the design basis were correctly translated into specifications, drawings, procedures, and instructions and that design changes were subject to design control measures commensurate with those applied to the original design. Specifically, the Unit 2 radwaste supply fans', 2VSF-7A and B, plenum doors and turbine building fire door 447 were maintained open, which provided a potential path for steam to enter the auxiliary building and impact both safety-related dc power trains during a high energy line break event in the turbine building. On February 12, 2014, the licensee suspended the modification and corrected the procedure. The licensee documented the concern in Condition Report CR-ANO-2-2014-00345.

The licensee's failure to maintain separation of safety related systems and high energy piping systems in accordance with design, as stated in the Safety Analysis Report, was a performance deficiency. The performance deficiency 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 availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Inspection Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," dated July 1, 2012 and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, dated July 1, 2012, the inspectors determined that the finding required a detailed risk evaluation because the finding represented a potential loss of system and/or function of the safety-related dc motor control centers, battery chargers and inverters.

A senior reactor analyst performed the detailed risk evaluation and determined that the change to the core damage frequency was less than  $4.8E-7$ /year (Green). The dominant core damage sequences included losses of the plant's DC electrical systems. The initiating event likelihood of a rupture of the specific section of piping needed to initiate core damage sequences was extremely low.

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# : [2015001](#) (*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  $2 \times 10^{-3}$  and qualitatively determined to likely be less than  $1 \times 10^{-4}$ . 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# : [2014009](#) (pdf)

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## Barrier Integrity

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## Emergency Preparedness

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## Occupational Radiation Safety

**Significance:**  Sep 30, 2015  
Identified By: Self-Revealing

Item Type: NCV Non-Cited Violation

### **Failure to Follow Procedure Results in Increased Reactor Coolant Activity**

Green. The inspectors reviewed a self-revealing non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” for failure to follow the instructions in the chemical volume control system charging pump pulsation dampener bladder charging procedure. Specifically, maintenance personnel used a gas cylinder containing argon, carbon dioxide, and oxygen rather than a pure nitrogen cylinder to charge the dampener as required by procedure 2411.066, “Charging Pump Dampener Bladder 115A, B, C and 2M-116A, B, C Checking and Depressurization,” Revision 05. Because the dampener had an existing bladder leak, the gas leaked into the reactor coolant system and the argon subsequently activated when it passed through the reactor. Reactor coolant system activity significantly increased, which elevated dose rates in the auxiliary building. The licensee entered this issue into their corrective action program as Condition Report CR-ANO-2-2015-02576. The licensee revised the procedure to require an independent verification of the gas before charging the pulsation dampeners.

The failure to follow the dampener charging procedure, which resulted in increased reactor coolant system activity and elevated dose rates in the auxiliary building, was a performance deficiency. The performance deficiency is more than minor because it is associated with the human performance attribute of the Occupational Radiation Safety Cornerstone and adversely affected the cornerstone objective to ensure the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. Specifically, charging argon into a pulsation dampener with a known bladder leak caused elevated dose rates in several plant areas. Using NRC Inspection Manual Chapter 0609 Appendix, C, “Occupational Radiation Safety Significance Determination Process,” issued August 19, 2008, the inspectors determined that the finding was of very low safety significance (Green) because it did not involve ALARA planning or work controls, did not involve an overexposure, did not have a substantial potential to be an overexposure, and the ability to assess dose was not compromised. The inspectors determined this finding had a cross-cutting aspect in the area of Avoid Complacency, because the plant maintenance mechanics failed to implement appropriate error reduction tools such as self-checking and peer-checking [H.12].

Inspection Report# : [2015003](#) (*pdf*)

## **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**

Last modified : March 01, 2016