

## Arkansas Nuclear 2 2Q/2016 Plant Inspection Findings

---

### Initiating Events

**Significance:** G Jun 30, 2016

Identified By: NRC

Item Type: FIN Finding

#### **Failure to Incorporate Vendor Guidance in Work Order**

The inspectors identified a finding for the failure to incorporate vendor instructions in a work order. Specifically, the licensee exceeded the vendor specified torque values and performed the work with the component in service, contrary to vendor cautions, breaking the glass, wetting the auxiliary feedwater pump, and necessitating the unplanned shutdown of the main feedwater pump. The licensee replaced the ruptured sight glass and repaired and tested the wetted components. The licensee documented the issue in Condition Report CR-ANO-2-2015-04832.

The failure to incorporate vendor instructions in a work order is a performance deficiency. The finding is more than minor because it adversely affected the procedure quality 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 (i.e., core damage). Specifically, the performance deficiency resulted in the Unit 2 auxiliary feedwater pump and main feedwater pump B being rendered unavailable. 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 2, "Mitigating Systems Screening Questions." The inspectors determined that the finding required a detailed risk evaluation because the finding involved an actual loss of function of auxiliary feedwater and one train of main feedwater, designated as having high safety significance in accordance with the licensee's maintenance rule program, for greater than 24 hours. 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 analyst assumed that all feedwater pumps were available until the time of the leak and that any increase in core damage frequency resulted from the unavailability of the pumps after the leak. The emergency feedwater system remained available to mitigate the increase in core damage frequency of this finding. The inspectors determined this finding has a cross-cutting aspect in the human performance area of Work Management because the primary cause of the performance deficiency involved the failure to identify and manage risk commensurate to the work and the need for coordination with different groups or job activities.

Inspection Report# : [2016002](#) (*pdf*)

**Significance:** G May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

#### **Failure to Complete Extent of Condition Reviews for the Stator Drop Significant Condition Adverse to Quality Event**

The team identified a Green finding and an associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," because the licensee failed to follow procedure EN-LI-102, "Corrective Action Program," which required verification that the required action has been completed as intended. Specifically, for the extent of condition reviews for the stator drop event, two corrective actions were closed even though the actions were inadequate. The licensee's corrective actions included re-performing the actions and documenting the failures in the corrective action program as condition reports CR-ANO-C-2016-00479 and CR-ANO-C-2016-00480.

The failure to complete two of the extent of condition reviews associated with the stator drop event specified in the associated corrective action plan was a performance deficiency. The performance deficiency was determined to be 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, the failure to complete actions related to identifying and correcting the extent of condition for a significant condition adverse to quality could potentially lead to an initiating event. The finding was evaluated using Inspection Manual Chapter 0609, “Significance Determination Process,” Attachment 0609.04, “Initial Characterization of Findings,” and Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” Exhibit 1 – “Initiating Events Screening Questions,” dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the inadequate closure of corrective actions did not cause a reactor trip or the loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition. This finding had a problem identification and resolution cross-cutting aspect of Resolution because the licensee did not take effective corrective actions to address issues in a timely manner commensurate with their safety significance. Specifically, the scope of the actions taken as part of the corrective actions did not resolve the issue as describe in the corrective action statement.

Inspection Report# : [2016007](#) (pdf)

**Significance:**  May 12, 2016

Identified By: NRC

Item Type: FIN Finding

#### **Inadequate Effectiveness Reviews for Corrective Actions to Prevent Recurrence**

The team identified a Green finding for the licensee’s failure to ensure that effectiveness reviews to assess the adequacy of corrective actions as required by procedure EN-LI-118-ANO-RC, “Cause Evaluation Process,” were appropriate. Specifically, the team identified numerous examples in which effectiveness reviews for corrective actions to prevent recurrence failed to assess whether corrective actions achieved the intended results. The licensee’s corrective actions included revising the effectiveness reviews to ensure that the corrective actions achieve the desired effect, and documenting the issue in the corrective action program as condition reports CR-ANO-C-2016-00482 and CR-ANO-C-2016-01013.

The failure to establish adequate effectiveness review success criteria to verify the intended results for corrective actions to prevent recurrence were achieved was a performance deficiency. The performance deficiency was determined to be more than minor because, it impacted the human performance attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure to complete actions related to identifying and correcting the extent for a significant condition adverse to quality could potentially lead to an initiating event. The finding was evaluated using Inspection Manual Chapter 0609, “Significance Determination Process,” Attachment 0609.04, “Initial Characterization of Findings,” and Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” Exhibit 1 – “Initiating Events Screening Questions,” dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because it did not cause a reactor trip or the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. This finding had a problem identification and resolution cross-cutting aspect of Self-Assessment because the licensee did not ensure that the organization routinely conducted self-critical and objective assessments of its programs and practices. Specifically, the Corrective Action Review Board tasked with validating the effectiveness of the corrective action plans did not ensure that the effectiveness review plans assessed whether the implemented corrective actions were effective.

Inspection Report# : [2016007](#) (pdf)

**Significance:** G May 12, 2016

Identified By: NRC

Item Type: FIN Finding

**Inadequate Operating Experience Evaluations**

The team identified a Green finding for the licensee's failure to evaluate operating experience as required by procedure EN-OE-100-02, "Operating Experience Evaluations." This procedure allowed taking no action for operating experience issues that were applicable to the station if multiple barriers existed to preclude failure. The team identified two examples where the licensee had not correctly verified the adequacy of credited barriers and as a result, represented a vulnerability to a similar event occurring at the station. The licensee's corrective actions included re-performing the operating experience evaluations and documenting the issue in the corrective action program as condition reports CR-ANO-C-2016-00463 and CR-ANO-C-2016-00782.

The failure to evaluate operating experience was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the protection against external factors attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure to take corrective action to address the large motor and respiratory protection operating experience could result in a similar adverse condition or event at the station. The finding was evaluated using Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 1 – "Initiating Events Screening Questions," dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the finding would not result in exceeding the reactor coolant system leak rate for a small loss of coolant accident or affect systems used to mitigate a loss of coolant accident, did not cause a reactor trip and loss of mitigation equipment, did not involve the loss of a support system, did not involve a degraded steam generator tube condition, and did not impact the frequency of a fire or internal flooding event. This finding had a human performance cross-cutting aspect of Conservative Bias because the licensee failed to ensure that individuals used decision making-practices that emphasized prudent choices over those that were simply allowable. Specifically, individuals performing evaluations rationalized assumptions rather than verifying the actual conditions.

Inspection Report# : [2016007](#) (*pdf*)

**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:** 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# : [2016007](#) (*pdf*)

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

## Mitigating Systems

**Significance:**  Jun 30, 2016

Identified By: NRC

Item Type: FIN Finding

### **Failure to Clean Main Feedwater Lube Oil Reservoir Leads to Reactor Power Reduction**

The inspectors documented a self-revealing finding for failure to clean the main feedwater turbine lube oil reservoir. Specifically, the main feedwater turbine lube oil reservoir had not been cleaned since 2006, causing clogged filters and low main feedwater turbine bearing oil pressure on February 5, 2016. The licensee entered this finding into their corrective action program as Condition Report CR-ANO-2-2016-00470 and implemented the necessary preventive maintenance.

The failure to perform preventive maintenance to ensure cleanliness on the main feedwater pump turbine bearing oil reservoir as required by the preventive maintenance program is a performance deficiency. The performance deficiency is more than minor because it impacted the equipment performance attribute and adversely affected the initiating events cornerstone objective to limit the likelihood of events that upset plant stability and challenged critical safety functions during shutdown as well as power operations. Specifically, the performance deficiency resulted in operators lowering reactor power and rendered a main feedwater pump unavailable. Using NRC Inspection Manual Chapter 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012, the inspectors screened the finding as having very low safety significance because the finding affected a transient initiator but did not result in a reactor trip. The inspectors determined that this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance. Specifically, the maintenance strategy changed in 2009.

Inspection Report# : [2016002](#) (*pdf*)

**Significance:**  Jun 24, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Inadequate Loop Flow Testing**

The team identified a non-cited violation of License Conditions 2.C.(8), "Fire Protection," for Unit 1; License Condition 2.C.(3)(b), "Fire Protection," for Unit 2; and the technical requirements manuals because the licensee did not properly test all portions of the underground fire piping. Specifically, the licensee did not determine the flow rates through two headers that provided water to the ring header supplying the Unit 2 auxiliary building as designed. The

licensee entered this violation into their corrective action program as Condition Report CR ANO-C 2016 02613 and initiated actions to conduct a flow test of the headers.

The failure to implement an adequate procedure to test underground fire piping was a performance deficiency. Specifically, the licensee did not test two headers included and designed as part of their underground fire piping to demonstrate that no faults had occurred. This performance deficiency was more than minor because it was associated with the protection against external factors attribute (fire) and adversely affected the Mitigating Systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to test two underground fire piping headers failed to demonstrate the capability to deliver adequate flow and pressure to the fire suppression systems as designed. The finding was screened in accordance with Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," dated June 19, 2012. Because the finding affected fixed fire protection systems or the ability to confine a fire, the team reviewed the finding using IMC 0609, Appendix F, Attachment 1, "Fire Protection Significance Determination Process Worksheet," dated September 20, 2013. The finding was screened as a Green finding of very low safety significance in accordance with Task 1.4.7, "Fire Water Supply," Question A. Although the licensee failed to test all portions of the underground fire piping in accordance with their license and technical requirements manual, the team determined that at least 50 percent of required fire water capacity would be available based on the testing that is done. As a result, the finding was determined to be of very low safety significance (Green).

The team determined that this finding did not have a cross-cutting aspect since it did not reflect current performance. Specifically, the licensee had not flow tested all underground fire piping headers since initial installation.

Inspection Report# : [2016009](#) (pdf)

**Significance:**  Jun 24, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

#### **Inadequate Procedure Used as a Compensatory Measure**

The team identified a non-cited violation of License Condition 2.C.(3)(b), "Fire Protection," for use of an inadequate procedure as a compensatory measure. Specifically, a procedure for providing temporary cooling to the safety parameter display system room when the normal room cooler is unavailable did not adequately address the impact of the temporary configuration on the ability to maintain safe and stable plant conditions for fires that require shutdown from outside the control room. The temporary room cooler did not have a power supply assured to remain available during a shutdown from outside the control room. The licensee entered this violation into their corrective action program as Condition Reports CR-ANO-2-2016-02143 and CR ANO-C-2016-02638. In response to this issue, the licensee developed a thermal analysis of the safety parameter display system room temperature during this scenario and confirmed that the maximum room temperature would not challenge the operation to the safety parameter display system.

The failure to provide an adequate procedure for use as a compensatory measure was a performance deficiency. The performance deficiency was more than minor because it was associated with the Mitigating Systems cornerstone attribute of procedure quality and adversely affected the associated cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events (fire) to prevent undesirable consequences. Specifically, loss of cooling to the safety parameter display system room could adversely affect the availability, reliability, and capability of the safety parameter display system which is required to respond to a fire resulting in the evacuation of the Unit 2 control room. A senior reactor analyst performed a detailed risk evaluation of this finding because IMC 0609, Appendix F, does not include explicit treatment of fires in the control room. An evaluation of the survivability of the safety parameter display system compared to the best estimate of the heatup of the room housing its equipment demonstrated that the safety parameter display system would survive with high probability until the

plant reached a safe and stable condition for the postulated fires. As a result, the finding was determined to be of very low safety significance (Green). This finding did not have a cross-cutting aspect since it was not indicative of present performance in that the performance deficiency occurred more than three years ago.

Inspection Report# : [2016009](#) (pdf)

**Significance:** G Jun 24, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Ensure that the Assumptions in the Engineering Analysis Remain Valid**

The team identified a non-cited violation of License Condition 2.C(3)(b), “Fire Protection,” for the failure to establish an appropriate monitoring program in accordance with National Fire Protection Association Standard 805, Section 2.6. Specifically, the licensee failed to set the action level for the availability of some plant components to ensure that the assumptions in the engineering analysis remained valid and also failed to establish a monitoring plan for the concurrent unavailability of one set of two components. The licensee entered the issues into their corrective action program as Condition Reports CR-ANO-2-2016-02355 and was in the process of developing corrective actions to address the monitoring of the components and work with industry organizations and Office of Nuclear Reactor Regulation to determine long-term resolution.

The failure to adequately monitor unavailability of the plant components to ensure that the assumptions in the engineering analysis remained valid was a performance deficiency. The performance deficiency was more than minor because if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern. Specifically, the performance deficiency could adversely affect the acceptable level of availability of the components which are used to respond to fire initiating events, in that the action levels for availability in the monitoring program were greater than the assumptions in the fire probabilistic risk assessment. The finding was screened in accordance with Inspection IMC 0609, “Significance Determination Process,” Attachment 4, “Initial Characterization of Findings,” dated June 19, 2012. Because the finding affected the ability to reach and maintain safe shutdown conditions in case of a fire, the team reviewed the finding using IMC 0609, Appendix F, Attachment 1, “Fire Protection Significance Determination Process Worksheet,” dated September 20, 2013. The finding was screened as a Green finding of very low safety significance in accordance with Step 1.3, “Ability to Achieve Safe Shutdown,” B Question. Based on the criteria in Appendix F, Attachment 2, “Degradation Rating Guidance Specific to Various Fire Protection Program Elements,” dated February 28, 2005, the finding was assigned a low degradation rating. Using Table A2.3, the inspectors assigned the low degradation rating because the issue involved monitoring of components that did not appreciably degrade below acceptable levels during the exposure period. This finding had a cross-cutting aspect associated with change management within the human performance area since leaders did not use a systematic process (e.g., assigning an overall owner) for evaluating and implementing change during the development of the monitoring program for the fire probabilistic risk assessment model for Unit 2.

Inspection Report# : [2016009](#) (pdf)

**Significance:** G May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Inadequate Control of Monitoring for Wall Loss in the Service Water System**

The team identified a Green finding and an associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” because the licensee failed to implement the Microbiologically Influenced Corrosion Monitoring Program in a manner that would monitor for pipe wall loss in the service water system. Specifically, the team identified that the licensee had not maintained representative monitoring points and allowed an excessive time period between pipe wall thickness inspections. The licensee’s corrective actions included initiating an evaluation of the Microbiologically Influenced Corrosion Monitoring Program and documenting the issue

in the corrective action program as condition reports CR-ANO-C-2016-00435, CR-ANO-C-2016-00524 and CR-ANO-C-2016-00546. The team did not identify a loss of structural integrity in any service water system pipe caused by these errors and therefore did not have an operability concern.

The failure to implement the Microbiologically Influenced Corrosion Monitoring Program was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the equipment performance 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, the failure to monitor service water system pipe locations for microbiologically influenced corrosion could result in a loss of pipe structural integrity (e.g., large pipe break) resulting in the loss of a service water train and adversely affecting safety-related equipment necessary for accident mitigation. The finding was evaluated using Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2 – "Mitigating Systems Screening Questions," dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of a mitigating system, structure or component, but the system, structure or component maintained its operability. This finding had a human performance cross-cutting aspect of Conservative Bias because the licensee failed to ensure that individuals used decision-making practices that emphasized prudent choices over those that were simply allowed. Specifically, the program database contained errors related to non-conservative decisions regarding the impact of monitoring points following pipe replacement and limiting the maximum time between monitoring for wall loss.

Inspection Report# : [2016007](#) (pdf)

**Significance:**  May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Failure to Include Unit 2 Service Water Pump Supports in the ASME Code Section XI Inservice Inspection Program**

The team identified a Green finding and an associated non-cited violation of 10 CFR 50.55a(g)(4) for the licensee's failure to inspect Unit 2 service water pump supports in accordance with ASME Code Section XI. Specifically, the licensee failed to include Unit 2 service water pump supports in the Inservice Inspection Program and had not completed a visual VT-3 examination since the supports were installed in 1991. The licensee's corrective actions included incorporating the supports into the Unit 2 Inservice Inspection Program, performing an immediate operability determination, assigning a corrective action to determine the past operability, and documenting the issue in the corrective action program as condition reports CR-ANO-2-2016-00361 and CR-ANO-2-2016-00421.

The failure to inspect the Unit 2 service water pump supports in accordance with ASME Code Section XI was a performance deficiency. The performance deficiency 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 to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to periodically inspect the pump supports could result in the failure to identify a nonfunctional support that would increase the risk of a pump failure. The finding was evaluated using Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2 – "Mitigating Systems Screening Questions," dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of a mitigating system, structure or component, but the system, structure or component maintained its operability. The team did not identify a cross-cutting aspect for this issue because the cause of this performance deficiency was not reflective of current performance.

Inspection Report# : [2016007](#) (pdf)



**Significance:** G May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Correct Degraded Unit 2 Train B Emergency Diesel Generator Heat Exchangers Service Water Flow and Degraded Unit 1 Containment Coatings**

The team identified two examples of a Green finding and an associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to correct conditions adverse to quality. Specifically, the licensee failed to correct long term degraded service water flow to the Unit 2 safety-related train B emergency diesel generator heat exchangers since 2008, and degraded Unit 1 reactor containment building coatings since 2009. The licensee's corrective actions included performing an operability determination and determining that the service water system and the Unit 1 containment sump were operable and documenting the issue in the corrective action program as condition reports CR-ANO-C-2016-00946, and CR-ANO-1-2015-00200.

The failure to correct conditions adverse to quality associated with Unit 2 service water flow to the B emergency diesel generator heat exchangers and the Unit 1 reactor containment building coatings was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to correct long term degraded: 1) service water flow beyond the action limit in accordance with procedure EN-DC-159, "Component and System Monitoring," to the B emergency diesel generator heat exchangers, which challenged the capability of emergency diesel generator response to design basis events; and 2) containment coatings which challenged the Unit 1 emergency core cooling system capacity. The finding was evaluated using Inspector Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of mitigating system, structure or component, but the system, structure or component maintained operability. This finding had a human performance cross-cutting aspect of Design Margins because the licensee failed to place special attention on maintaining margins in safety-related equipment. Specifically the licensee has repeatedly: 1) throttled service water flow away from the safety-related shutdown cooling heat exchangers, reducing the shutdown cooling design margins to maintain minimally acceptable flow to the emergency diesel generator heat exchangers since 2008; and 2) reduced the available containment sump margin rather than correct containment coating deficiencies.

Inspection Report# : [2016007](#) (*pdf*)

**Significance:** G May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Maintain Service Water Design Cooling to the Unit 2 High Pressure Safety Injection Pump Seal and Bearing Coolers**

The team identified a Green finding and an associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to assure that the design basis service water cooling flow rates for the Unit 2 high pressure safety injection pump bearing and seal coolers were correctly translated into operating and surveillance procedures. Specifically, the pump surveillance and operating procedures were inadequate to monitor for, or correct degraded service water flow to the pump seal and bearing coolers. The procedures allowed for zero flow to the coolers, whereas the design drawing required 20 gallons per minute. The licensee's corrective actions included performing an immediate operability determination and determining the pumps were operable based on the most recent surveillance flow tests, requesting a prompt operability determination, scheduling inspection of the seal and bearing coolers, and documenting the issue in the corrective action program as condition reports CR-ANO-2-2016-00672 and CR-ANO-2-2016-00674.

The failure to correctly incorporate the design basis service water cooling flow for the Unit 2 high pressure safety injection pump coolers into the operating and surveillance procedures was a performance deficiency. The performance deficiency 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 to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to incorporate the design basis service water cooling flow into the operating and surveillance procedures could result in the failure of the high pressure safety injection pumps during accident mitigation. The finding was evaluated Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2 – "Mitigating Systems Screening Questions," dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of a mitigating system, structure or component, but the system, structure or component maintained its operability. The team did not identify a cross-cutting aspect for this issue because the cause of this performance deficiency was not reflective of current performance.

Inspection Report# : [2016007](#) (*pdf*)

**Significance:**  May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Inadequate Flow Monitoring of Unit 2 Service Water to Emergency Feedwater Pump Suction Supply**

The team identified a Green finding and an associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," for the licensee's failure to establish a test program for the Unit 2 service water supply to emergency feedwater pump suction lines. Specifically, the licensee failed to demonstrate that flow through this line would remain satisfactory for design basis accidents. The licensee's corrective actions included performing an operability determination and determining that the last performance of the procedure in 2015 documented a flow rate greater than the required value, was evaluating the lack of a surveillance test program for monitoring flow rate loss in these lines, and documenting the issue in the corrective action program as condition report CR-ANO-2-2016-00670.

The failure to establish a test program for the Unit 2 service water to emergency feedwater pump suction supply line was a performance deficiency. The performance deficiency was determined to be more than minor because, it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to monitor the flow through the Unit 2 service water to emergency feedwater pump suction supply line could result in loss of adequate flow to support emergency feedwater pumps for accident mitigation. The finding was evaluated using Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2 – "Mitigating Systems Screening Questions," dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of a mitigating system, structure or component, but the system, structure or component maintained its operability. The team did not identify a cross-cutting aspect for this issue because the error that caused this deficiency was not reflective of current performance.

Inspection Report# : [2016007](#) (*pdf*)

**Significance:**  May 12, 2016

Identified By: NRC

Item Type: FIN Finding

**Failure to Develop an Operability Decision-Making Issue for Degraded Condition on Safety Injection Tank**

The team identified a Green finding for the licensee's failure to create an operational decision making issue document

per procedure EN-OP-111, “Operability Decision Making Issue (ODMI) Process.” Specifically, the licensee failed to evaluate the plant impact and operational challenges associated with not repairing safety injection tank check valve 2SI-13D bonnet leakage, which was identified prior to starting up from the fall 2016 outage. The leakage increased to the point where normal makeup capability was challenged. The licensee’s corrective actions included performing an unplanned shutdown to repair safety injection tank check valve 2SI-13D, and documenting the issue in the corrective action program as condition reports CR-ANO-2-2016-00546, CR-ANO-C-2016-0948, and CR-ANO-C-2016-01348.

The failure to establish operational decision making issue guidance per procedure EN-OP-111 to address safety injection tank check valve 2SI-13D leakage was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the equipment reliability 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 leak became an operational challenge, in that, operators were filling the safety injection tank for the majority of the shift. The finding was evaluated using Inspection Manual Chapter 0609, “Significance Determination Process,” Attachment 0609.04, “Initial Characterization of Findings,” and Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” Exhibit 2 – “Mitigating Systems Screening Questions,” dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because it did not represent an actual loss of function of at least a single train for greater than its technical specification allowed outage time, and did 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 problem identification and resolution cross-cutting aspect of Self-Assessment because the licensee did not conduct self-critical and objective reviews of degraded plant issue to determine whether they should be addressed using the operational decision making issue process.

Inspection Report# : [2016007](#) (pdf)

**Significance:**  May 12, 2016

Identified By: NRC

Item Type: FIN Finding

#### **Failure to Perform Predictive Maintenance on Safety-Related Medium-Voltage Switchgear**

The team identified a Green finding for the licensee’s failure to fully implement procedure EN-DC-310, “Predictive Maintenance Program,” Revision 7. Specifically, the licensee failed to perform predictive maintenance-related thermography on medium-voltage safety-related electrical switchgear. The team identified that the predictive maintenance equipment list appropriately included the medium-voltage switchgear as components in the predictive maintenance program. However, the monitoring was not being scheduled or performed. The licensee’s corrective actions included performing an operability determination and determining that there was no impact to the performance of the switchgear, creating tasks to perform thermography, and documenting the issue in the corrective action program as condition report CR-ANO-C-2016-00571.

The failure to perform predictive maintenance on safety-related medium-voltage switchgear as required by procedure EN-DC-310 was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, degradation of safety-related medium voltage switchgear could go unidentified for extended periods, reducing system reliability. The finding was evaluated using Inspection Manual Chapter 0609, “Significance Determination Process,” Attachment 0609.04, “Initial Characterization of Findings,” and Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” Exhibit 2 – “Mitigating Systems Screening Questions,” dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because it did not represent an actual loss of function of at least a single train for greater than its technical specification allowed outage time, and did 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 problem identification and resolution cross-cutting aspect of Identification because the licensee did not

identify issues completely, accurately, and in a timely manner. Specifically, the licensee did not identify that their implementation of the Predictive Maintenance Program did not appropriately address safety-related medium-voltage switchgear as requiring periodic thermography inspections.

Inspection Report# : [2016007](#) (*pdf*)

**Significance:** G May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Properly Implement the Corrective Action Program**

The team identified a Green finding and an associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” for the licensee’s failure to follow corrective action program procedures. Specifically, the team identified that condition reports were not being promptly screened for operability by the control room as required by procedure EN-LI-102-ANO-RC, “Corrective Action Program.” The licensee’s corrective actions included ensuring that there was no direct impact on safety and performing an operability determination for the identified condition reports, revising station policy to require that all condition reports be routed to the control room for review, and documenting the issue in the corrective action program as condition reports CR-ANO-C-2016-00359, CR-ANO-C-2016-00400, and CR-ANO-C-2016-00558.

The failure to properly evaluate condition reports for classification and operability determination was a performance deficiency. The performance deficiency was determined to be more than minor because, it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to properly evaluate condition reports in accordance with applicable procedures could result in conditions adverse to quality being left uncorrected or not being evaluated to ensure operability was maintained. The finding was evaluated using Inspection Manual Chapter 0609, “Significance Determination Process,” Attachment 0609.04, “Initial Characterization of Findings,” and Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” Exhibit 2 – “Mitigating Systems Screening Questions,” dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the design or qualification of a mitigating system, structure or component, but the system, structure or component maintained its operability. This finding had a human performance cross-cutting aspect of Change Management because the licensee failed to adequately implement changes, including the training of staff concerning those changes, so that nuclear safety remained an overriding priority. Specifically, the licensee failed to ensure that station personnel were able to identify the difference between an “adverse” and “non-adverse” condition following the change which added these criteria to procedure EN-LI-102-ANO-RC.

Inspection Report# : [2016007](#) (*pdf*)

**Significance:** G Mar 31, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Follow Design Control Requirements for Pump Seal Cooler Replacements**

The inspectors identified a Green finding and an associated non-cited violation of 10 CFR 50, Appendix B, Criterion III, “Design Control,” for the failure to ensure the suitability of materials used in safety-related equipment. Specifically, the licensee made a change to the material used in ten safety-related pump bearing coolers without considering the potential effects of corrosion. As a result, a drain plug corroded and caused service water to spray, rendering two safety-related pumps inoperable. This issue was entered into the corrective action program as Condition Report CR-ANO-2-2016-00550.

The failure to consider the potential for corrosion in the design of safety-related equipment is a performance deficiency. The performance deficiency is more than minor because it adversely affected the design control attribute

of the mitigating system cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, in each of the three examples, the licensee made changes to the plant where the potential effects of corrosion on safety-related equipment was not considered. Using Inspection Manual Chapter 0609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” the inspectors screened this finding as Green, because the finding did not represent an actual loss of safety function. The inspectors determined that this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance.

Inspection Report# : [2016001](#) (*pdf*)

**Significance:**  Mar 31, 2016

Identified By: Self-Revealing

Item Type: NCV Non-Cited Violation

### **Blocked Drain Results in Emergency Feedwater Pump Inoperability**

The inspectors documented a self-revealing Green finding with an associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI, “Test Control,” for the failure to verify that the floor drains in the Unit 2 turbine-driven emergency feedwater pump room would pass the amount of water added to the drain during operation of the pump in order to prevent the pump from becoming submerged. As a result, the licensee was unaware that the turbine-driven emergency feedwater pump room drain had become blocked until water began pooling in the room during a pump test. Upon discovery, the licensee stopped the pump, declared the train inoperable, and cleared the drain. This finding was entered into the licensee’s corrective action program as Condition Report CR-ANO-2-2016-0384.

The failure to verify that the Unit 2 turbine-driven emergency feedwater pump room drain would pass the water added to the drains during operation of the turbine-driven emergency feedwater pump is a performance deficiency. The finding is more than minor because it adversely affected the protection against external factors (i.e., flood hazard) attribute of the mitigating systems cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the failure to detect a clogged drain affected the availability of the emergency feedwater system by potentially flooding the room and failing the pump. The inspectors evaluated the finding using Manual Chapter 0609 Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” 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. A senior reactor analyst performed a detailed risk evaluation and estimated the total increase in core damage frequency to be  $7.7E-7$ /year, and therefore the finding had very low safety significance (Green). The inspectors determined that this finding did not have a cross-cutting aspect because the most significant contributor, inadequate documentation of the pump design requirements during initial plant construction, does not reflect current licensee performance.

Inspection Report# : [2016001](#) (*pdf*)

**Significance:**  Mar 31, 2016

Identified By: Self-Revealing

Item Type: NCV Non-Cited Violation

### **Failure to Inject Service Water with Corrosion Inhibitors during Refueling Outages**

The inspectors reviewed a self-revealing Green finding and an associated non-cited violation for the failure to follow Procedure OP-1052.007, “Secondary Chemistry Monitoring,” Revision 040. Specifically, the licensee failed to inject corrosion inhibiting chemicals into Unit 2 service water during refueling outages, which resulted in increased corrosion of the service water system. This issue was entered into the corrective action program as Condition Report CR-ANO-2-2016-02879.

The failure to inject corrosion inhibitors into Unit 2 service water during refueling outages resulted in increased corrosion of the service water system is a performance deficiency. The performance deficiency is more than minor

because it adversely affected the human performance attribute of the mitigating system cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the performance deficiency adversely affected the structural strength of service water system boundaries. Using NRC Inspection Manual Chapter 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Dated June 19, 2012, the inspectors screened the finding as having very low safety significance because it is a deficiency affecting the design or qualification of a mitigating SSC, but the SSC maintained its operability. The inspectors determined that this finding had a cross-cutting aspect in the human performance area of Avoid Complacency, because the licensee failed to recognize the potential consequences of isolating chemical injection to the service water during outages, which contributed to degradation.

Inspection Report# : [2016001](#) (pdf)

**Significance:** G 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:** 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# : [2016007](#) (pdf)

Inspection Report# : [2014009](#) (pdf)

## Barrier Integrity

**Significance:**  May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Failure to Maintain Structural Design Clearances Inside the Units 1 and 2 Reactor Containment Buildings**

The team identified a Green finding and an associated non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” for the licensee’s failure to ensure that numerous structural components located inside Units 1 and 2 reactor containment buildings were installed per structural drawings. The team identified numerous sections of floor grating and ¼ inch plate steel supports that came in direct contact with the containment liner. In some cases, contact between the containment liner and the components resulted in damage to the liner and the liner protective coating. The licensee’s corrective actions included performing an operability determination and determining that the



Units 1 and 2 containment liner was operable but degraded and nonconforming, establishing plans to correct the deficiencies in each unit's upcoming outage, and documenting the issue in the corrective action program as condition reports CR-ANO-1-2016-00492, CR-ANO-2-2016-00397, and CR-ANO-2-2016-00413.

The failure to ensure that numerous structural components inside Units 1 and 2 reactor containment buildings were properly installed was a performance deficiency. The performance deficiency was determined to be more than minor because, it was associated with the configuration control 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 accident or events. Specifically, the failure to ensure that items inside the Units 1 and 2 reactor containment buildings were installed per structural drawings could result in damage to the safety-related containment liner and challenge its function to protect the public from radionuclide releases. The finding was evaluated using Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 3 – "Barrier Integrity Screening Questions," dated June 19, 2012. The team determined the finding was of very low safety significance (Green) because the finding did not represent an actual open pathway in the physical integrity of reactor containment and did not involve an actual reduction in function of hydrogen ignitors. This finding had a problem identification and resolution cross-cutting aspect of Identification because the licensee failed to implement a corrective action program with a low threshold for identifying issues. Specifically, the licensee failed to identify numerous containment liner stand-off clearance deficiencies during the required containment liner inspections over the operating life of the plant.

Inspection Report# : [2016007](#) (pdf)

## Emergency Preparedness

## Occupational Radiation Safety

**Significance:** G 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 : August 29, 2016