

Arkansas Nuclear 1

3Q/2016 Plant Inspection Findings

Initiating Events

Significance:  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:  Mar 31, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Assess and Manage Hot Work Risk

The inspectors identified a Green finding and an associated non-cited violation of 10 CFR 50.65(a)(4), “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants,” for the failure to assess and manage the increase in risk due to performing hot work near risk-significant Unit 1 non-vital switchgear. Specifically, the licensee failed to identify the work as having “low integrated risk,” and implement required risk management actions to protect available fire pumps and brief the fire brigade. As immediate corrective actions, the licensee stopped the hot work until they completed a risk assessment and risk management actions. This finding was entered into the licensee’s corrective action program as Condition Report CR-ANO-1-2016-00348.

The failure to assess and manage the increase in risk of performing hot work near risk-significant Unit 1 non-vital switchgear is a performance deficiency. The finding is more than minor because it adversely affected the protection against external factors (i.e., fires) 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 assess the potential for hot work to cause a fire, and manage the risk to critical safety functions. Because the finding affects the assessment of risk associated with performing maintenance activities, NRC Manual Chapter 0609, Attachment 4, “Initial Characterization of Findings,” directs significance determination using NRC Manual Chapter 0609, Appendix K, “Maintenance Risk Assessment and Risk Management Significance Determination Process.” A regional senior reactor analyst used Manual Chapter 0609, Appendix K, Flowchart 2, “Assessment of Risk Management Actions,” dated May 19, 2005, to assess the significance of the finding. The licensee site probabilistic risk assessment engineer provided information which estimated the incremental core damage probability deficit of 3.3E-10. The analyst confirmed similar results using the NRC probabilistic risk assessment model. The incremental large early release probability deficit was conservatively estimated to be equal to the incremental core damage probability deficit. Since this issue dealt only with the failure to take risk management actions, Flowchart 2, “Assessment of Risk Management Actions,” of Appendix K was used. In accordance with Flowchart 2, because the incremental core damage probability deficit was less than 1E-10 and the incremental large early release probability deficit was less than 1E-7, the finding screened as having very low safety significance (Green). The inspectors determined this finding has a problem identification and resolution cross-cutting aspect in the area of Teamwork, because the most significant contributor involved the failure to communicate and coordinate activities across organizational boundaries to ensure nuclear safety is maintained. Specifically, work groups did not inform operations work control personnel that hot work was part of the intended work.

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

Significance:  Mar 31, 2016

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to Identify and Repair Intermittent Card Failure Before Returning to Service Causes Reactor Trip

The inspectors reviewed a self-revealing Green finding for the failure to fully understand a malfunction which resulted in putting susceptible cards back into the Unit 1 integrated control system. In 2014, a failure caused a feedwater transient, which operators successfully mitigated. Troubleshooting identified and repaired some of cards susceptible to the intermittent problem. The licensee reinstalled cards that had not been repaired in the integrated control system, which later caused a feedwater transient and subsequent manual reactor trip on December 15, 2015. The licensee documented the issue in Condition Report CR-ANO-1-2015-04178 and replaced the cards.

The failure to fully understand a malfunction, which resulted in putting susceptible cards back into the Unit 1 integrated control system, is a performance deficiency. The finding is more than minor because it adversely affected the equipment performance 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 placed the suspect cards back into the integrated control system, which caused a feedwater transient and contributed to a subsequent manual reactor trip. Using NRC Manual Chapter 0609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” dated June 19, 2012, Exhibit 1, “Initiating Events Screening Questions,” the finding screened as having very low safety significance (Green) because the deficiency resulted in a reactor trip, but mitigation equipment remained unaffected. Specifically, main feedwater remained available. The inspectors determined this finding has a problem identification and resolution cross-cutting aspect in the area of Evaluation, because the primary cause of the performance deficiency involved the failure to thoroughly evaluate a 2014 integrated control system failure so that the resolution addressed the cause commensurate with safety significance.

Inspection Report# : [2016001](#) (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 1 - Failure to Follow the Materials Handling Program during the Unit 1 Generator Stator Move

Unit 1 Apparent Violation. The inspectors reviewed a self-revealing apparent violation of 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures and Drawings,” which states, in part, that “activities affecting quality shall be

prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures or drawings.” The licensee did not follow the requirements specified in Procedure EN-MA-119, “Material Handling Program,” in that, the licensee did not perform an adequate review of the subcontractor’s lifting rig design calculation and the licensee failed to conduct a load test of the lifting rig prior to use. The licensee initiated Condition Report CR-ANO-C-2013-00888 to capture this issue in the corrective action program. The licensee’s corrective actions included repairing damage to the Unit 1 turbine deck, fire main system, and electrical system. In addition, changes were made to various procedures including Procedure EN-DC-114, “Project Management,” to provide guidance on review of calculations, quality requirements, and standards associated with third party reviews.

The inspectors determined that the finding was more than minor because it was associated with the procedural control attribute of the initiating event cornerstone, and adversely affected the cornerstone’s objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown, as well as power operations. The stator drop affected offsite power to Unit 1, resulting in a loss of offsite power for approximately 6 days and a loss of the alternate AC diesel generator. The inspectors used Inspection Manual Chapter 0609, Attachment 0609.04, “Initial Characterization of Findings,” dated June 19, 2012, to evaluate the significance of the finding. Since the plant was shutdown, the inspectors were directed to Inspection Manual Chapter 0609, Appendix G, Attachment 1, “Shutdown Operations Significance Determination Process Phase 1 Operational Checklists for Both PWRs and BWRs,” Checklist 4, dated May 25, 2004. Using Appendix G, Attachment 1, Checklist 4, the inspectors concluded that this finding represented a degradation of the licensee’s ability to add reactor coolant system inventory when needed since a loss of offsite power occurred and therefore, this finding required a Phase 3 analysis. A shutdown risk model was developed by modifying the at-power Arkansas Nuclear One Unit 1 Standardized Plant Analysis Risk Model, Revision 8.19. The NRC risk analyst assessed the significance of shutdown events by calculating an instantaneous conditional core damage probability. The results were dominated by two sequences. The largest risk contributor (approximately 97 percent) was based on a failure of the emergency diesel generators without recovery. The second largest risk contributor was the failure to recover decay heat removal. The result of the analysis was an instantaneous conditional core damage probability of $3.8E-4$; therefore, this finding was preliminarily determined to have high safety significance (Red).

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

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

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

Inspection Report# : [2013012](#) (*pdf*)

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

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

Mitigating Systems

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:  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 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:  May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Emergency Feedwater Pump Casing Wall Loss Not Monitored

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 monitoring the Unit 1 emergency feedwater pumps casing wall thickness loss to demonstrate that the pumps would remain satisfactory for service. The scope of the Wall Thinning Aging Management Program included the emergency feedwater pumps casing. However, the team noted that the procedure did not include wall thickness measurements on the emergency feedwater pumps casings. The licensee's corrective actions included performing an immediate operability determination and determining the pumps were operable, and documenting the issue in the corrective action program as condition report CR-ANO-1-2016-00606.

The failure to establish a test program for monitoring the Unit 1 emergency feedwater pumps casing wall thickness loss 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 Unit 1 emergency feedwater pumps casing wall thickness could result in a corrosion- or erosion-induced pump casing 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. This finding had a human performance cross-cutting aspect of Work Management for failing to implement a process of planning, controlling, and executing work activities such that nuclear safety is an overriding priority. Specifically, the licensee entered the period of extended operation in May 2014 and had not established a surveillance procedure to monitor the corrosion induced wall loss of the pump casings as required by the approved aging management program. Inspection Report# : [2016007](#) (*pdf*)

Significance:  May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Pressurizer Block Valve Not Installed in the Qualified Environmental Configuration

The team identified a Green finding and an associated non-cited violation of 10 CFR 50.49(f) for the licensee's failure to ensure that Unit 1 pressurizer block valve CV-1000, was installed in the qualified configuration. Specifically, the safety-related motor operated block valve was installed with the limit switch compartment facing downward instead of up. The licensee's corrective actions included performing a prompt operability determination and determining the valve was operable, evaluating the extent of condition, and documenting the issue in the corrective action program as condition report CR-ANO-C-2016-00884.

The failure to ensure the pressurizer motor operated block valve CV-1000 was in the qualified configuration was a performance deficiency. The performance deficiency was determined to be 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 initiating events to prevent undesirable consequences. Specifically, valve CV-1000 not being installed in the qualified configuration increased the possibility of leaking grease or accumulating condensation in the limit switch compartment which could cause failure, electrical shorts or erratic operation. 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 problem identification and resolution cross-cutting aspect of Operating Experience because the licensee failed to systematically and effectively collect, evaluate, and implement relevant internal and external operating experience in a timely manner.

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:  May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Update Probabilistic Risk Assessment Model in a Timely Manner Results in Failure to Submit Complete and Accurate Information

The team identified a Green finding for the licensee's failure to update the Level 1 probabilistic risk assessment model as required by procedure EN-DC-151, "Probabilistic Safety Assessment (PSA) Maintenance and Update," Revision 5. This finding also involved a Severity Level IV, non-cited violation of 10 CFR 50.9, "Completeness and Accuracy of Information," because the licensee failed to submit complete and accurate model maintenance information in their license amendment request for the extension of the integrated leak rate testing for the Unit 1 reactor building. Procedure EN-DC-151 established requirements to ensure that ANO's models represent the as-built, as-operated plant in a manner sufficient to support the applications for which they are used, including performing periodic updates

within four years of the previous update. The licensee had not updated the internal events model for Unit 1 since July 2009 and for Unit 2 since 2008. The licensee's corrective actions included completing the model update for Unit 1 on April 15, 2016, for Unit 2 on February 29, 2016, and documenting the issue in the corrective action program as condition report CR-ANO-C-2016-01573.

The failure to perform probabilistic risk assessment updates as required by procedure EN-DC-151 was a performance deficiency and therefore a finding. An NRC-identified violation of 10 CFR 50.9 was associated with this finding because it impacted the regulatory process in that inaccurate information was provided to the NRC that was material in making a licensing decision. Therefore, in accordance with Inspection Manual Chapter 0612, Appendix B, "Issue Screening," this issue was evaluated using both the finding and traditional enforcement processes. This violation is associated with a finding that has been evaluated by the significance determination process and communicated with a significance determination process color reflective of the safety impact of the deficient licensee performance. The significance determination process, however, does not specifically consider the regulatory process impact. Thus, although related to a common regulatory concern, it is necessary to address the violation and finding using different processes to correctly reflect both the regulatory importance of the violation and the safety significance of the associated finding.

The performance deficiency was determined to be more than minor because it was associated with the equipment performance and procedure quality attributes 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 lack of a formal process to ensure that probabilistic risk assessment model updates were performed as scheduled impacted license amendment requests, performance indicator accuracy, and daily maintenance risk evaluations for planned and emergent maintenance activities since the internal events model was not reflective of current plant conditions. 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.

Consistent with Section 6.9 of the NRC Enforcement Policy, this violation was determined to be a Severity Level IV violation because inaccurate information was provided, but it would not have likely caused the NRC to reconsider its regulatory position or undertake substantial further inquiry.

This finding had a human performance cross-cutting aspect of Resources because the licensee did not ensure that sufficient personnel resources were available to perform all probabilistic risk assessment duties, including model maintenance.

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 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: **Y** Aug 01, 2014

Identified By: NRC

Item Type: VIO Violation

Inadequate Flood Protection for Auxiliary and Emergency Diesel Fuel Storage Buildings

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

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

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

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

The NRC risk analysts determined that the finding should be evaluated in accordance with NRC Inspection Manual Chapter 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria," April 12, 2012. Appropriate quantitative significance determination process tools did not exist to provide a reasonable estimate of the significance because a plant-specific flood hazard analysis did not exist and was not expected to be available until sometime in 2015. The risk analysts used NRC Inspection Manual Chapter 0609, Appendix M, Table 4.1, "Qualitative Decision-Making Attributes for NRC Management Review," to determine the preliminary safety significance of the finding. The following were the dominant considerations in reaching a preliminary risk determination conclusion:

1. With respect to the auxiliary and emergency diesel fuel storage buildings, there were more than 100 unknown ingress pathways for a flooding event, therefore if an external flood above grade level were to occur, the buildings would flood.
2. The unexpected rate of flooding would likely be beyond the licensee's capability to prevent or mitigate as equipment and connections associated with alternative mitigating strategies, could be submerged.
3. All reactor core cooling and makeup could fail due to significant flooding of the auxiliary and emergency diesel fuel storage buildings.

4. The change in core damage frequency was quantitatively bounded below 2×10^{-3} and qualitatively determined to likely be less than 1×10^{-4} . The bounding and qualitative results are based on the frequency of the probable maximum flood event and a loss of all equipment needed for core cooling and makeup.

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

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

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

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

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

Inspection Report# : [2014010](#) (*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)

Significance:  Dec 31, 2015

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Properly Translate the Design Requirements for the Unit 1 Decay Heat Vault Rooms Being Sealed

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the failure to correctly translate the regulatory requirements and design basis into specifications, drawings, procedures, and instructions to ensure the Unit 1 decay heat vault boundary components could perform their safety-related function. Inspectors identified that the Unit 1 decay heat vaults had a safety-related function to limit accident dose consequences to the public and the control room operators, but some boundary components had not been classified as safety-related. In response to this issue, the licensee performed an immediate operability determination and reviewed previous leakage testing on the containment spray and low pressure injection systems. This issue was entered into the licensee's corrective action program as Condition Report CR-ANO-1-2015-04195.

The inspectors determined that the failure to correctly translate the design requirement that the Unit 1 decay heat vaults be sealed to mitigate the dose consequences of an accident into specifications, drawings, procedures, and instructions was a performance deficiency. This performance deficiency was more than minor because it was associated with the design control and safety-related structures, systems, and components and barrier performance attributes of the Barrier Integrity cornerstone and adversely affected the cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events for the auxiliary building. Specifically, the licensee failed to ensure that Unit 1 decay heat vault boundary components were designated as safety-related components and met the applicable requirements needed to assure the reliability and integrity of the barrier function. Using Inspection Manual Chapter 0609, Appendix A, Exhibit 3, "Barrier Integrity Screening Questions," the issue screened as having very low safety significance (Green) under the Control Room, Auxiliary, Reactor, or Spent Fuel Pool Building questions because the finding only represented a degradation of the radiological barrier function provided for the control room and the auxiliary building and it did not represent a degradation of the barrier function of the control room against smoke or a toxic atmosphere. The inspectors determined that this finding did not have a cross-cutting aspect because the most significant contributor did not reflect current licensee performance since this condition had existed since construction. (Section 4OA5)

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

Emergency Preparedness

Occupational Radiation Safety

Significance:  May 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

Failure to Properly Calibrate Unit 1 Reactor Building Atmospheric Particulate Radiation Monitor RE-7460

The team identified a Green finding and an associated non-cited violation of 10 CFR 20.1501(c) because the licensee

failed to ensure that instruments and equipment used for quantitative radiation measurements were calibrated periodically for the radiation measured. Specifically, the licensee did not properly calibrate the Unit 1 Reactor Building Atmospheric Particulate Radiation Monitor RE-7460. The license's corrective actions, included removing radiation monitor RE-7460 from service, instituting compensatory measures for assessing reactor coolant system leak detection in accordance with Technical Specification 3.4.15, "RCS Leakage Detection Instrumentation," and documenting the issue in the corrective action program as condition reports CR-ANO-1-2016-00056 and CR-ANO-1-2016-01087.

The failure to properly calibrate radiation monitor RE-7460 was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the plant instrumentation attribute of the Occupational Radiation Safety cornerstone and adversely affected the cornerstone objective to ensure adequate protection of the worker health and safety from exposure to radiation from radioactive material. Specifically, the failure to properly calibrate radiation monitor RE-7460 adversely impacted its ability to be used to identify reactor coolant system leakage and the ability to assess radioactive airborne concentrations and dose rates. The finding was evaluated using the significance determination process in accordance with Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Initial Characterization of Findings," dated June 19, 2012, and Appendix C, "Occupational Radiation Safety Significance Determination Process," dated August 19, 2008. The team determined that the finding was of very low safety significance (Green) because it was not an as-low-as-reasonably-achievable (ALARA) issue, there was no overexposure or substantial potential for an overexposure, and the ability to assess dose was not compromised. This finding had a human performance cross-cutting aspect of Documentation because the licensee failed to create and maintain complete, accurate and up-to-date documentation. Specifically, the licensee personnel failed to translate the vendor manual instruction to ensure the detector was installed against the hard stop so that it was in the correct position to make the calibration valid.

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

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Miscellaneous

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