

## Waterford 3

### 3Q/2012 Plant Inspection Findings

---

### Initiating Events

**Significance:** G Jun 30, 2012

Identified By: Self-Revealing

Item Type: FIN Finding

**Failure to establish adequate procedural guidance to control feedwater heater level control valves**

A self-revealing finding occurred because the licensee did not establish adequate procedural guidance to control feedwater heater level control valves. Specifically, the procedures used to control the settings for the valves did not contain guidance that properly adjusted the proportional gain and air pressure input to ensure the valves open quickly during a transient. As a result, multiple failures in the feedwater heater drain system resulted in a feedwater pump A trip and a subsequent reactor power cutback. The licensee entered this condition into their corrective action program as CR-WF3-2012-1729 for resolution. The corrective actions included a revision of the procedure and loop calibration settings for the feedwater heater level control valves.

The failure to provide adequate guidance that properly adjusted the proportional gain to ensure the valves open as designed is a performance deficiency. The performance deficiency is more than minor because it is associated with the procedure quality attribute of the Initiating Events cornerstone and affects the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, multiple feedwater heater control valve failures resulted in a reactor power cutback that upset plant stability. The inspectors used the NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," to determine the significance. The inspectors determined that the finding is of very low safety significance (Green) because it only contributed to the likelihood of a reactor trip and not the likelihood that mitigation equipment or functions would not be available. This finding has a cross-cutting aspect in the resources component of the human performance area in that the licensee did not ensure that complete, accurate, and up-to-date design documentation for loop calibration settings was available to assure nuclear safety [H.2(c)].

Inspection Report# : [2012003](#) (*pdf*)

---

### Mitigating Systems

**Significance:** G Jun 30, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis**

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III because the licensee did not provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis. Specifically, the licensee did not ensure that the design calculation used to determine the required number of wet cooling tower fans needed to operate the plant under normal and design conditions utilized the correct equation. As a result, the incorrect calculation provided reasonable doubt as to the operability of the wet

cooling tower fans. The licensee entered this issue into their corrective action program as CR-WF3-2012-1395. The immediate corrective actions taken to restore compliance included a preliminary analysis of the condition and actions to perform a review of the methodology, inputs, and assumptions for the ultimate heat sink thermal performance calculations.

The failure to provide adequate design control measures for verifying or checking the adequacy of the ultimate heat sink thermal performance analysis is a performance deficiency. The performance deficiency is more than minor because it is associated with the design control attribute of the Mitigating System Cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the wet cooling tower fans are required to be operable for heat removal following all accidents and anticipated operational occurrences. The inspectors used the NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," to determine the significance. The inspectors determined that the finding is of very low safety significance (Green) because it is a design deficiency confirmed not to result in a loss of operability or functionality of the ultimate heat sink. This finding has a cross-cutting aspect in the decision making component of the human performance area in that the licensee did not conduct effectiveness reviews of safety-significant decisions to verify the validity of the underlying assumptions, identify possible unintended consequences, and determine how to improve future decisions [H.1(b)].

Inspection Report# : [2012003](#) (pdf)

**Significance:** G Mar 31, 2012

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

**Failure to Develop Preventive Maintenance Tasks for Critical Limit Switches on Component Cooling Water Inlet Isolation Valves**

A Green self-revealing, non-cited violation of Waterford Steam Electric Station, Unit 3, Technical Specification 6.8.1.a occurred because the licensee did not establish procedures for performing preventive maintenance tasks on the dry cooling tower component cooling water inlet isolation valves CC-135A and CC-135B limit switches. Specifically, the licensee had not developed preventive maintenance tasks to lubricate or replace critical limit switches that provide a permissive for the operation of the dry cooling tower fans. As a result, on February 4, 2011, the limit switch on valve CC-135A failed to operate as designed and rendered an entire train of fans inoperable. The licensee entered this condition into their corrective action program as CR-WF3-2011-0679 for resolution. The immediate corrective action included the lubrication of the limit switch and the manual stroking of the valve to obtain free and smooth movement of the degraded equipment. The planned corrective actions included the development of a preventive maintenance task to lubricate and replace the limit switches on a scheduled frequency.

The failure to establish procedures for performing preventive maintenance tasks on the dry cooling tower component cooling water inlet isolation valves CC-135A and CC-135B limit switches is a performance deficiency. The performance deficiency is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, since there was no preventive maintenance task for lubrication and replacement of the equipment, the limit switches can become stuck and render an entire train of dry cooling tower fans inoperable. The inspectors determined the significance of the finding using the NRC Inspection Manual 0609, Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings." The inspectors determined that the finding is of very low safety significance (Green) because it is not a design or qualification deficiency, did not represent a loss of a safety function of a system or a single train for greater than its technical specification completion time, and did not screen as potentially risk-significant due to an external initiating events. The inspectors also concluded that no cross-cutting aspect is applicable to this finding because the performance deficiency is not reflective of current performance.

Inspection Report# : [2012002](#) (pdf)

**Significance:**  Mar 31, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Identify and Perform Testing to Demonstrate Performance of Safety-Related Valves**

The inspectors identified a Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI, because the licensee did not identify and perform testing on a safety-related component to demonstrate that it would perform satisfactorily in service in accordance with requirements contained in applicable design documents. Specifically, the licensee did not identify and perform proper testing for the essential chiller hot gas bypass valves RFR-106A, B, and C. As a result, the licensee could not demonstrate that the safety-related valves would perform satisfactorily in service without performing a test and operability evaluation. The licensee entered this condition into the corrective action program as CR-WF3-2012-0632 and CR-WF3-2012-0659. The immediate corrective action included testing the hot gas bypass valves to demonstrate the proper performance of their safety function.

The failure to identify and perform testing to demonstrate that a safety-related component would perform satisfactorily in service in accordance with requirements contained in applicable design documents is a performance deficiency. The performance deficiency is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the hot gas bypass valve closure is required to ensure the essential chiller can perform its safety function during all design basis accident conditions. The inspectors determined the significance of the finding using the NRC Inspection Manual 0609, Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings." The inspectors determined that the finding is of very low safety significance (Green) because it is not a design or qualification deficiency, did not represent a loss of a safety function of a system or a single train for greater than its technical specification completion time, and did not screen as potentially risk-significant due to any external initiating events. This finding has a cross-cutting aspect in the resources component of the human performance area in that the licensee did not ensure that complete, accurate, and up-to-date test procedures were available to demonstrate that equipment performance is adequate to assure nuclear safety [H.2(c)]

Inspection Report# : [2012002](#) (pdf)

**Significance:**  Feb 17, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Adequately Evaluate the Impact of Fire Damage on the Dry Cooling Tower Fans**

The team identified a non-cited violation of License Condition 2.C.9 and Appendix R, Section III.G for the failure to adequately evaluate the impact of fire damage on the dry cooling tower fans. Specifically, the failure to adequately evaluate fire damage to the dry cooling tower fans did not ensure one train remained available to achieve and maintain hot shutdown conditions from the alternate shutdown panel. The licensee documented this deficiency in Condition Report 2012-00837.

The failure to adequately evaluate the impact of fire damage on the dry cooling tower fans was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated this deficiency using Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process." The performance deficiency affected the fire protection defense-in depth strategies involving post-fire safe shutdown systems. Since this finding involved a control room

abandonment issue, a senior reactor analyst performed a Phase 3 significance determination. The senior reactor analyst determined this finding had very low risk significance based upon a bounding analysis (Green). The dominant core damage sequences involved a fire initiating event, failure of both the component cooling water and auxiliary component cooling water systems, as well as an independent failure of the turbine driven auxiliary feedwater pump. Equipment that helped to mitigate the significance included the unaffected offsite power system, the viable steam generators and the safety related auxiliary feedwater system. Because the original failure to evaluate the impact of fire damage on the dry cooling tower fans had occurred longer than three years prior to this inspection, this finding did not reflect current licensee performance.

Inspection Report# : [2012007](#) (pdf)

**Significance:** G Feb 17, 2012

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Calculate Adequate Cooling Provided to Diesel Generator B within Required Time**

The team identified a non-cited violation of License Condition 2.C.9 and the fire protection program for the failure to perform a post-fire safe shutdown analysis design calculation. Specifically, the team determined that the licensee had not calculated the time available to establish component cooling water to prevent damaging the emergency diesel generator when providing power to post fire safe shutdown components. The licensee documented this deficiency in Condition Report 2012 00818.

The failure to perform a design calculation evaluating the ability to remove heat based upon emergency diesel generator loading following a control room fire was a performance deficiency. The performance deficiency was more than minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team evaluated the significance of this finding using Manual Chapter 0609, Appendix F. The performance deficiency affected the fire protection defense-in depth strategies involving post-fire safe shutdown systems. Using Appendix F, the team assigned this finding a low degradation rating because the system was expected to display nearly the same level of effectiveness and reliability as it would had the degradation not been present. Specifically, the component cooling water system could accommodate the heat in the jacket water system of a lightly loaded diesel generator. This finding screened as very low safety significance (Green) in the Phase 1 evaluation. Because the original failure to perform a design calculation had occurred longer than three years prior to this inspection, this finding did not reflect current licensee performance.

Inspection Report# : [2012007](#) (pdf)

**Significance:** G Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Identify and Correct a Condition Adverse to Quality Associated with the Main Feedwater Isolation Valves**

The inspectors identified a non-cited violation of 10CFR50, Appendix B, Criterion XVI because the licensee failed to identify and correct a condition adverse to quality associated with the main feedwater isolation valve. Specifically, the licensee did not identify that varnish deposits were causing the main feedwater isolation valve to fail its inservice testing. As a result, corrective actions that were implemented did not address the adverse condition, leading to a subsequent test failure. The licensee entered this issue into their corrective action program as CRWF3-2011-2005 and CR-WF3-2011-8140. The corrective actions included the replacement of the

actuator, a shortening of the replacement frequency of the fourway hydraulic valves to a 36 month interval, and an evaluation of the current methods of gathering and implementing operating experience.

The performance deficiency is more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the main feedwater isolation valve is credited for closure during a main feedwater line break. The inspectors performed the initial significance determination using the NRC Inspection Manual 0609, Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings." The finding screened to a Phase 2 significance determination because it involved a loss of one train of safety related equipment for longer than the technical specification allowed outage time. A Region IV senior reactor analyst performed a Phase 2 significance determination and used the pre-solved worksheet from the "Risk Informed Inspection Notebook for the Waterford-3 Nuclear Power Plant," Revision 2.01a. However, the main feedwater isolation valves were not included in the pre-solved worksheet and the valves did not appear as components in the Phase 2 significance determination worksheets. The senior reactor analyst performed a Phase 3 significance determination for this issue. The analyst noted that the main feed isolation valves were not a significant contributor to core damage frequency and were not included in the NRC's SPAR model. These valves close to mitigate core overcooling events or to isolate feedwater flow to a ruptured feedwater line inside containment. Overcooling events do not lead to core damage. A ruptured feedwater line could challenge containment integrity, but without core damage there would be no potential for a large early release. If a valve failed to close on demand, the licensee had other means to isolate feedwater flow to a steam generator or into containment. Operators could secure feedwater pumps, close a block valve, or close the main feedwater flow control valves. Accordingly, the contribution to core damage was much less than E-6. Therefore, the inspectors determined that this finding had very low safety significance (Green). This finding has a cross-cutting aspect in the operating experience component of the problem identification and resolution area in that the licensee did not collect and evaluate relevant external operating experience to identify that other sites experienced similar failures of feedwater isolation valves due to varnish deposits on the interior surface [P.2(a)].

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

**Significance:** G Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Translate Tornado Impact on the Ultimate Heat Sink During a Refueling Outage**

The inspectors identified a non-cited violation of 10CFR50, Appendix B, Criterion III because the licensee did not translate applicable regulatory requirements and the design basis into specifications and instructions. Specifically, the licensee did not translate the design basis tornado event into a design calculation. This outage-specific calculation was referenced by operations as the basis to ensure that the number of dry cooling tower fans needed for decay heat removal remained available. As a result, additional analysis needed to be performed to verify that the ultimate heat sink would have been able to perform its design function had a design basis tornado occurred during refueling outage RF-17. The licensee entered this issue into their corrective action program as CRWF3-2011-6480. The immediate corrective actions taken to restore compliance included analysis of the condition and actions to ensure that future outage specific calculations include the tornado design basis event.

The performance deficiency is more than minor because it challenges the equipment performance attribute of the Mitigating Systems cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating

events to prevent undesirable consequences. Since the calculation was used when the plant was shutdown, the inspectors used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists." The issue was determined to have a very low safety significance (Green) because it did not require a quantitative assessment. Through calculation review, the inspectors concluded that this failure resulted in the potential to enter an unanalyzed condition. This finding had a crosscutting aspect in the resources component of the human performance area in that the licensee failed to incorporate accurate design information into instructions [H.2(c)].  
Inspection Report# : [2011005](#) (*pdf*)

**Significance:** G Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Follow Work Order Instructions to Install a Swagelok Fitting on a Main Feedwater Isolation Valve Tube Connection**

The inspectors identified a non-cited violation of Technical Specification 6.8.1.a because the licensee did not follow work order instructions to install a pressure gage in an air line used to measure and maintain pressure for the hydraulic accumulators that close the main feedwater isolation valve. Specifically, the licensee did not follow the instructions to assemble and tighten a Swagelok fitting according to the work order. As a result, the fitting failed, preventing the valve from being able to perform its safety-related function. The licensee entered this issue into their corrective action program as CR-WF3-2010-1166 and CRWF3-2011-7469. The immediate corrective actions included repairing the Swagelok fitting and completing an apparent cause evaluation to determine the nature of the fitting failure and failure to follow procedure.

The performance deficiency is more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspector performed the initial significance determination using NRC Inspection Manual 0609, Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings." The finding screened to a Phase 2 significance determination because it involved a potential loss of one train of safety related equipment for longer than the technical specification allowed outage time. A Region IV senior reactor analyst performed a Phase 2 significance determination and used the pre-solved worksheet from the "Risk Informed Inspection Notebook for the Waterford-3 Nuclear Power Plant," Revision 2.01a. However, the main feedwater isolation valves were not included in the pre-solved worksheet and the valves did not appear as components in the Phase 2 significance determination worksheets. The senior reactor analyst performed a Phase 3 significance determination for this issue. The analyst noted that the main feed isolation valves were not a significant contributor to core damage frequency and were not included in the NRC's SPAR model. These valves close to mitigate core overcooling events or to isolate feedwater flow to a ruptured feedwater line inside containment. Overcooling events do not lead to core damage. A ruptured feedwater line could challenge containment integrity, but without core damage there would be no

potential for a large early release. If a valve failed to close on demand, the licensee had other means to isolate feedwater flow to a steam generator or into containment. Operators could secure feedwater pumps, close a block valve, or close the main feedwater flow control valves. Accordingly, the contribution to core damage was much less than E-6. As a result, this finding had a very low safety significance (Green). This finding does not have a crosscutting aspect since it is not indicative of current plant performance.

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

**Significance:**  Oct 07, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Assure Design Basis Input was Correctly Translated into Design Basis Calculations**

The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” which states, in part, that “measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.” Specifically, prior to September 28, 2011, the licensee failed to assure that design basis information associated with loading the auxiliary component cooling water pumps on the Class 1E Bus was correctly translated in various design basis calculations. This finding was entered into the licensee’s corrective action program as Condition Reports CR-WF3-2011-06737 and CR-WF3-2011-06808.

The team determined that the failure to verify the adequacy of the design for loading the auxiliary component cooling water pumps on the Class 1E Bus in various design basis calculations was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the inadequate design calculations could have prevented continued operation of the emergency diesel generator under degraded voltage, short circuit, and increased fuel oil consumption conditions. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was a design deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee revised the associated calculations to include the required 295 brake horsepower value and reanalyzed for verification of operability. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Inspection Report# : [2011007](#) (*pdf*)

**Significance:**  Oct 07, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Establish an Adequate Containment Spray Pump Design Basis Verification Surveillance Test**

The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion XI, “Test Control,” which states, in part, “A program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate acceptance limits contained in applicable documents.” Specifically, as of October 4, 2011, the licensee did not have an adequate test procedure to verify containment spray pump design basis accident performance requirements. This finding was entered into the licensee’s corrective action program as Condition Report CR-WF3-2011-06852.

The team determined that the failure to either have a stand-alone design basis accident containment spray pump

verification test or to have it adequately incorporated into the in-service testing requirements was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, neither the design basis analysis nor related in-service test surveillances, accounted for the inherent uncertainty of the flow element in the overall instrument uncertainty evaluation. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Inspection Report# : [2011007](#) (*pdf*)

**Significance:**  Oct 07, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Provide an Adequate Basis for Extrapolation of Vendor Supplied Pump Net Positive Suction Head Values**

The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," which states, in part, that "measures shall be established to assure that applicable regulatory requirements and the design bases are correctly translated into specifications, drawings, procedures, and instructions." Specifically, as of October 4, 2011, the licensee extrapolated the values for required pump net positive suction head beyond those provided in vendor certified curves without adequate analysis or justification. Consequently, the licensee, per the station-approved net positive suction head analysis, could have operated the safety-related pumps in beyond-analyzed or vendor-approved flow regimes. This finding was entered into the licensee's corrective action program as Condition Report CR-WF3-2011-06870.

The team determined that the failure to provide adequate justification for extrapolation of net positive suction head values beyond those provided in the certified pump vendor data was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, potential pump cavitation at higher than analyzed or vendor-approved operation, could have rendered mitigating equipment (i.e., pumps) to fail. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was a design deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed additional analyses to assure that the pumps could safely operate in the required flow regimes. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Inspection Report# : [2011007](#) (*pdf*)

**Significance:**  Oct 07, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Provide Adequate Preventive Maintenance Procedures for Aluminum/Copper Electrical Connections to the Ultimate Heat Sink Transformers**

The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," which states, "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. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.” Specifically, as of October 7, 2011, when developing and implementing preventive maintenance procedures and work orders for transformers and electrical connections, the licensee failed to provide specific acceptance criteria and instructions addressing the potential vulnerability of these connections to degradation from galvanic reaction or differential thermal expansion, particularly in a high humidity outdoor environment. This finding was entered into the licensee’s corrective action program as Condition Report CR-WF3-2011-06832.

The team determined that the failure to provide suitable acceptance criteria and instructions in preventive maintenance procedures and work orders applicable to the aluminum/copper electrical connections to the transformers was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, inadequate preventive maintenance of the aluminum/copper connections could lead to degradation of the electrical connections to the station service transformer and loss of the ultimate heat sink. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was not a design or qualification deficiency, did not represent a loss of system safety function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Inspection Report# : [2011007](#) (*pdf*)

**Significance:**  Oct 07, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Establish an Analysis to Support the Adequacy of the Four Inch Bulkhead Drain to Protect the Ultimate Heat Sink During Flood Events**

The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” which states, in part, that “measures shall be established to assure that applicable regulatory requirements and the design bases are correctly translated into specifications, drawings, procedures, and instructions. The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.” Specifically, prior to October 7, 2011, the licensee failed to establish and maintain an analysis supporting the adequacy of a single four-inch overflow (bulkhead) drain for protecting the ultimate heat sink motor control center from flooding during a design basis probable maximum precipitation event. Failure of the motor control center as a result of flooding from the probable maximum precipitation event could result in the loss of the associated ultimate heat sink because the motor control center serves both the dry cooling tower and wet cooling tower fan motors. This finding was entered into the licensee’s corrective action program as Condition Report CR-WF3-2011-06701.

The team determined that the failure to establish and maintain an analysis supporting the adequacy of a single four-inch overflow (bulkhead) drain for protecting the ultimate heat sink motor control center from flooding during a design basis probable maximum precipitation event was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the design basis analysis for the four-inch bulkhead drain did not ensure that the motor control center would be adequately protected during a probable maximum precipitation event. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, “Phase 1 – Initial Screening and Characterization of Findings,” the issue was determined to have very low safety significance (Green) because it was a

design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed calculations to justify the adequacy of the installed bulkhead drain for the probable maximum precipitation event. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Inspection Report# : [2011007](#) (*pdf*)

**Significance:**  Oct 07, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Establish an Analysis of the Effects of Reverse Rotation of Dry Cooling Tower Fan Motors Resulting from a Tornado Event**

The team identified a Green violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” which states, in part, that “measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.” Specifically, prior to October 7, 2011, the licensee failed to analyze the dry cooling tower fan motors for premature trip as a result of reverse rotation caused by a tornado event that could result in the loss of the dry cooling tower heat removal capability. This finding was entered into the licensee’s corrective action program as Condition Report CR-WF3-2011-06850.

The team determined that the failure to establish and maintain an analysis supporting the ability of the dry cooling tower fan motors to operate successfully during and following a design basis tornado event was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the design basis analysis did not ensure that the dry cooling tower fan motors would perform as required under reverse rotation conditions, without premature trip, during a design basis tornado. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, “Phase 1 – Initial Screening and Characterization of Findings,” the issue was determined to have very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee prepared an evaluation of the effect on fan motor starting current and duration for reverse rotation conditions. For reverse rotation conditions that would extend the locked rotor current time by a factor of two, the licensee’s analysis showed ample margin for the instantaneous trip settings from the magnetic-only breaker and the thermal overload protection, such that premature trip would be precluded. This finding did not have a crosscutting aspect because the most significant contributor did not reflect current licensee performance.

Inspection Report# : [2011007](#) (*pdf*)

**Significance:**  Oct 07, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Provide an Adequate Basis for Temperature Limits of Auxiliary Component Cooling Water Pump Motor Bearings**

The team identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” which states, in part, that “measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions.” Specifically, prior to October 7, 2011, the licensee did not have an adequate technical basis for increasing the auxiliary component cooling

water pump motor bearing temperature alarm setpoints or establishing an upper limit on motor bearing temperature, which directed operators to secure the pump. This finding was entered into the licensee's corrective action program as Condition Report CR-WF3-2011-06573.

The team determined that the failure to provide an adequate basis for increasing the high bearing temperature alarm setpoints and establishing a high temperature motor trip criterion was a performance deficiency. This finding was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," the issue was determined to have very low safety significance (Green) because it was a design or qualification deficiency confirmed not to result in loss of operability or functionality. Specifically, the licensee performed an engineering justification for the bearing temperatures based on industry guidance. This finding was determined to have a cross-cutting aspect in the area of human performance associated with the decision making component because the licensee did not use conservative assumptions in decision making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate that it is unsafe in order to disapprove the action [H.1(b)].

Inspection Report# : [2011007](#) (pdf)

**Significance:** G Oct 07, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Adequately Manage the Risk Involved with a Maintenance Window for the Turbine Driven Essential Feedwater Pump**

The team identified a Green noncited violation of 10 CFR 50.65(a)(4), which states, in part, that "the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities." Specifically, on October 28, 2010 the turbine driven essential feedwater pump was out of service for maintenance for approximately 12 hours. During this time the licensee unknowingly entered the Orange risk window (crossed a risk threshold) due to a faulty assumption in the probabilistic risk assessment model. This finding was entered into the licensee's corrective action program as Condition Report CR-WF3-2011-06653.

The team determined that the failure to perform adequate risk assessments is a performance deficiency. This finding was more than minor because it was associated with the human performance attribute of the Mitigating Systems Cornerstone, adversely affecting the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings," the issue was identified as requiring a Phase 2 evaluation. A Region IV Senior Reactor Analyst performed a Phase 2 significance determination using NRC Inspection Manual Chapter 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." In accordance with Appendix K:

$$\text{Delta-CDF} = [\text{CCDP}_{\text{Actual}} - \text{CCDP}_{\text{flawed}}] * \text{duration} / 8760$$

The licensee bounded the duration of the turbine driven essential feedwater pump maintenance at 8 hours in a year. The flawed ICDP was  $3.1\text{E-}5$ , the actual ICDP was  $3.1\text{E-}5 + 1.9\text{E-}5 = 5.0\text{E-}5$ . The difference was  $1.9\text{E-}5$ .

$$\text{Delta-CDF} = 1.9\text{E-}5 * 12/8760 = 2.6\text{E-}8$$

Therefore, the issue was determined to have very low safety significance (Green). This finding was determined to have a cross-cutting aspect in the area of problem identification and resolution associated with the self and

independent assessments component because the licensee performed a probabilistic risk assessment model update in April 2009, which failed to identify the faulty assumption [P.3(a)].

Inspection Report# : [2011007](#) (*pdf*)

---

## Barrier Integrity

**Significance:**  Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

### Inoperable Train of Containment Cooling System

The inspectors identified a non-cited violation of Technical Specification Limiting Condition for Operation 3.6.2.2, “Containment Cooling System”, which requires in Modes 1, 2, 3, and 4 that “Two independent trains of containment cooling shall be OPERABLE with one fan cooler to each train. The Technical Specification Action statement requires that “With one train of containment cooling inoperable, restore the inoperable train to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours; restore the inoperable containment cooling train to OPERABLE status within the next 48 hours or be in COLD SHUTDOWN within the next 30 hours. Specifically, from July 11, 2009, to July 19, 2009, the licensee failed to declare train B of the containment cooling system inoperable, and restore it to operable status within 72 hours or place the unit in hot standby in 6 hours. This finding has been entered into the licensee’s corrective action program as Condition Reports CR-WF3-2011-08150.

The inspectors determined that the failure to meet Technical Specification Limiting Condition for Operation 3.6.2.2 was a performance deficiency. The finding was more than minor because it adversely affected the structures, systems, and components and barrier performance attribute of the Barrier Integrity cornerstone objective to provide reasonable assurance that physical design barriers (containment) protect the public from radionuclide releases caused by accidents or events. Specifically, the component cooling water flow for containment cooling system train B decreased below the minimum flow limits of Technical Specification Surveillance Requirement 4.6.2.2. In accordance with NRC Inspection Manual Chapter 0609, Attachment 4, “Phase 1 – Initial Screening and Characterization of Findings,” the issue was determined to have very low safety significance (Green) because it did not represent an actual open pathway in the physical integrity of reactor containment and heat removal components, and did not involve an actual reduction in the function of hydrogen igniters in the reactor containment. This finding was determined to have a crosscutting aspect in the area of human performance associated with the decision making component because the licensee did not use conservative assumptions in decision making and adopt a requirement to demonstrate that the proposed action is safe in order to proceed rather than a requirement to demonstrate that it is unsafe in order to disapprove the action [H.1(b)].

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

---

## Emergency Preparedness

---

## Occupational Radiation Safety

## Public Radiation Safety

**Significance:** SL-IV Dec 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Periodically Update the Updated Final Safety Analysis Report**

The inspectors identified a non-cited violation of 10 CFR 50.71 "Maintenance of Records," because the licensee failed to update their updated final safety analysis report with submittals that include a change made to the facility.

Specifically, the licensee built the low level radwaste storage facility in 1995 on the owner controlled area for interim radwaste storage of dry and solidified radioactive waste and failed to update the updated final safety analysis report to include these changes. This issue was entered in the licensee's corrective action program as condition report WF3-2011-07711.

This issue was dispositioned using traditional enforcement because it had the potential for impacting the NRC's ability to perform its regulatory function. The finding is more than minor because it has a material impact on licensed activities in that stored radwaste materials with a significant radioactive source term has been relocated from the plant radiologically controlled area to the owner controlled area.

In addition, the radwaste management program has been affected because the licensee was not originally licensed to act as a low level waste facility. However, the termination of the Barnwell Low Level Radioactive Waste Management facility has forced the licensee to build such a storage area and make changes to the facility, significantly increasing the onsite storage capacity. The inspectors determined that this finding did not reflect present performance because it is an issue with changes made to the facility more than 15 years previously. Therefore, there was no cross-cutting aspect associated with this finding. This finding is characterized as a Severity Level IV non-cited violation in accordance with NRC Enforcement Policy, Section 6.1, and was treated as a non-cited violation consistent with Section 2.3.2.a of the NRC Enforcement Policy

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

---

## 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 : November 30, 2012