

Brunswick 2

4Q/2011 Plant Inspection Findings

Initiating Events

Mitigating Systems

Significance: **G** Dec 31, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Verify Bearing Oil Level Resulted in Residual Heat Removal Service Water Pump Failure

Green. A self-revealing Green non-cited violation of TS 5.4.1, Procedures, was identified for failure to implement procedural requirements for verifying lubrication levels on the 2B RHRSW Booster pump. This finding resulted in failure of the 2B RHRSW Booster pump. The condition was entered into the licensee's corrective action program as AR #489386 and the licensee investigated the failure and repaired the pump.

The failure to follow procedural requirements for verifying lubrication levels was a performance deficiency. The performance deficiency was more than minor because it was associated with the Mitigating Systems cornerstone attribute of Equipment Performance – Availability, 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 failure of the 2B RHRSW booster pump which is credited for decay heat removal and service water injection. Using Inspection Manual Chapter 0609, Significance Determination Process, Attachment 0609.04, Phase 1 Screening Worksheet, the finding screened as potentially greater than green because it represented an actual loss of a single train of equipment for more than its Technical Specifications (TS) allowed outage time. Therefore, a phase 2 significance determination evaluation was required. The significance of this finding is designated as very low safety significance (Green) using Phase 2 pre-solved tables. The cause of the finding was directly related to the training cross-cutting aspect in the Resources component of the Human Performance area because the licensee failed to ensure that workers had adequate knowledge of the RHRSW pump oilers to execute procedures for verifying lubrication levels which caused a failure of a safety-related pump. [H.2(b)] (Section 1R12)

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

Significance: **W** Nov 21, 2011

Identified By: NRC

Item Type: VIO Violation

Failure to Identify and Correct a Degraded Flood Barrier for the Emergency Diesel Generator Fuel Oil Tank Rooms

(TBD) The inspectors identified an Apparent Violation (AV) of 10 CFR Part 50 Appendix B Criterion XVI, Corrective Action, for failure to identify and correct a condition adverse to quality associated with the entrance enclosures for the Emergency Diesel Generator (EDG) fuel oil tank rooms. Specifically, the enclosures contained openings which would adversely impact their ability to mitigate external flooding of the EDG fuel oil tank rooms in the event of a design basis external event (hurricane). These openings were not identified or corrected by the licensee prior to the inspectors identifying the issue. The licensee corrected this condition by installing new sealant material to close the openings and entered the issue into their corrective action program. The licensee entered this issue into their corrective action program as AR 466253.

The licensee's failure to identify and correct the degradation of the access enclosures to the EDG fuel oil tank rooms was a performance deficiency. The finding is more than minor because it affects the Mitigating Systems cornerstone

attribute of protection against external events and affects the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Specifically, the water entry pathways into the EDG fuel oil tank rooms increased the likelihood of EDG failure during an external weather event (hurricane). The significance of this finding was evaluated using Inspection Manual Chapter 0609, Significance Determination Process. Using the phase 1 worksheet tables 4a and 4b, the finding was evaluated to be potentially greater than green because it screens as potentially risk significant due to a seismic, flooding, or severe weather initiating event which would degrade two or more trains of a multi-train system or function. Table 4a of the phase 1 worksheet requires a phase 3 significance determination evaluation. Following the initial review of this matter using preliminary quantitative analysis, Appendix M was used considering the uncertainties in the bounding analysis and the insights from the qualitative review (See Appendix M in Enclosure 2 and Phase 3 in Enclosure 3 of this report). There is a lack of quantitative data and probabilistic risk assessment tools to accurately assess the risk significance of this performance deficiency in a timely manner. The NRC preliminarily concluded that, although licensee performance is outside the bounds of nominal performance, cornerstone objectives were met with minimal reduction in safety margin. The Agency concluded that the finding likely did not represent a decline in licensee performance with a significant reduction in safety margin. Based on the available information from the quantitative and qualitative analyses, and the guidance of Appendix M, the NRC concluded that this performance deficiency is preliminarily characterized as a low to moderate safety significance finding (White). This finding has a cross-cutting aspect in the Corrective Action Program component of the Problem Identification and Resolution area because the licensee did not identify the issue completely, accurately, and in a timely manner commensurate with its safety significance, [P.1(a)].

Final Determination Letter: 2011-014

During an NRC inspection conducted on April 20, 2011 a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

10 CFR Part 50 Appendix B Criterion XVI, Corrective Action states, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected.

Contrary to the above, as of April 20, 2011, the licensee failed to identify and promptly correct a condition adverse to quality involving the external flood barrier for the EDG fuel oil tank rooms. Specifically, the entrance enclosures which house the EDG fuel oil tanks had several openings, unsealed pin holes, and a narrow gap along the perimeter of the base walls, which would allow water intrusion into the EDG fuel oil tank rooms during a design basis external event (hurricane).

Inspection Report# : [2011012](#) (pdf)

Inspection Report# : [2011014](#) (pdf)

Significance:  Sep 30, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Inadequate Configuration Control Resulted in Rainwater Intrusion into the Unit 2 Reactor Building

A self-revealing Green non-cited violation of TS 5.4.1, Procedures, was identified for failure to implement procedural requirements of the equipment configuration control program to ensure that temporary power cables routed through an open manhole and into the reactor building north RHR (NRHR) room did not adversely impact the flood mitigation function of the storm drain system. This finding resulted in rainwater intrusion into the unit 2 reactor building. Upon discovery of this condition, the licensee resealed the manhole. The condition was entered into the licensee's CAP as AR #483473.

The failure to implement the requirements of the equipment configuration control program to ensure that the temporary cable routing did not adversely impact external flood protection features was a performance deficiency. The performance deficiency was more than minor because it was associated with the Mitigating Systems cornerstone attribute of Protection Against External Factors - Flood Hazards and adversely affected the cornerstone objective in that the temporary change impacted the storm drain system which was credited for external flood protection. Using Inspection Manual Chapter 0609, Significance Determination Process, Attachment 0609.04, Phase 1 Screening Worksheet, the finding screened as very low safety significance (Green) because it: (1) was not a design or

qualification deficiency that was confirmed not to affect equipment operability; (2) did not represent a loss of safety function; (3) did not represent an actual loss of a single train of equipment for more than its Technical Specification allowed outage time; (4) did not represent a loss of risk significant non-Technical Specification equipment; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event per table 4b of the worksheet because the leakage did not degrade the RHR system. The cause of the finding was directly related to the appropriately planning work activities cross-cutting aspect in the Work Control component of the Human Performance area because the licensee failed to incorporate environmental conditions which may impact plant structures, systems, and components into the temporary change. [H.3(a)]

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

Significance:  Sep 30, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Corrective Actions for Control Building Air Conditioning Failures

The inspectors identified a Green non-cited violation of 10 CFR 50 Appendix B, Criteria XVI, Corrective Action, for the licensee's failure to promptly identify and correct a condition adverse to quality related to the Control Room Air Conditioning (AC) system. Specifically, the licensee failed to identify and correct repetitive failures of nonconforming low ambient temperature damper actuators for the 2D control building air cooled condenser unit. This resulted in multiple control building AC refrigerant circuit failures. Upon discovery of the issue, the licensee placed the control building AC system in a safe condition for summer operation and initiated actions to procure acceptable damper actuators prior to the onset of low seasonal temperatures. The condition was entered into the licensee's CAP as AR #462873.

The inspectors determined that the licensee's failure to promptly identify and correct the failures of the 2D control room AC system low ambient temperature damper actuators was a performance deficiency. This finding is more than minor because it is associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone, and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Specifically, the finding reduced the reliability of the control building AC system and its ability to maintain control building equipment within specified temperature limits. The significance of the finding was evaluated using Phase 1 of the significance determination process in accordance with the Inspection Manual Chapter 0609 Attachment 4. The finding was determined to be of very low safety significance (Green) because the finding was a design or qualification deficiency that was confirmed not to affect equipment operability. The cause of this finding was directly related to the cross cutting aspect of thorough evaluation of problems in the Corrective Action Program component of the Problem Identification and Resolution area, because the licensee failed to promptly evaluate the failures of the low ambient temperature damper actuators and eliminate the adverse condition. [P.1(c)]

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

Significance:  Jan 21, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Analyze MOV Operation with Transient Voltages

Green. The team identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to use conservative motor control center (MCC) voltage inputs when calculating motor actuator output torque and control circuit voltages for safety-related motor operator valve (MOV) motors that would be required to operate during design bases events. Specifically, the licensee used steady state MCC voltages instead of more limiting transient voltages that would occur during design bases load sequencing.

The licensee entered these issues into their corrective action program as NCRs 427745 and 429541 and performed additional analyses to demonstrate operability of the MOVs.

The licensee's failure to evaluate MOV motor actuator output torque using transient MCC voltages, and the failure to evaluate whether those MOVs would have adequate control power voltage was a performance deficiency. The

performance deficiency was more than minor because it is associated with the mitigating systems cornerstone attribute of design control 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 use of non-conservative voltage inputs for MOV calculations could result in the failure of the components to perform their design bases functions during an event. The inspectors conducted a Phase 1 SDP in accordance with IMC 0609.04, "Initial Screening and Characterization of Findings," and determined the finding to be of very low safety significance (Green) because it was a design deficiency confirmed not to result in the loss of operability or functionality, did not represent the loss of a system function, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The finding directly involved the cross-cutting aspect of procedural compliance and personnel follow procedures within the Work Practices component of the Human Resources area [H.4(b)].

Inspection Report# : [2010008](#) (*pdf*)

Significance:  Jan 21, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Promptly Identify and Correct Isolation Override Circuitry Testing Deficiencies

Green. The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to assure that conditions adverse to quality, such as deficiencies, were promptly identified and corrected. Specifically, after identifying that the Unit 1 and 2 isolation override switches associated with the hardened wet well (Torus) vents should have been scoped in the maintenance rule, the licensee failed to ensure the circuitry was monitored for functionality. Because the circuitry was not monitored, a relay in the Unit 1 circuitry degraded unacceptably without the licensee's knowledge. This finding does not present an immediate safety concern because as an immediate corrective action the failed relay in the Unit 1 control circuitry was replaced. The licensee entered the issue into their corrective action program as NCR 428054.

The licensee's failure to identify that the isolation override control switches were not being tested in the manner that they would be operated in the EOPs was a performance deficiency. The performance deficiency was more than minor because it is associated with the mitigating systems cornerstone attribute of equipment performance 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, not testing the isolation override circuitry resulted in a failed component going undetected that adversely impacted the ability to mitigate an event with the hardened wet well vent.

Using Manual Chapter Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the inspectors determined the finding required a Phase 2 analysis because the finding represented an actual loss of safety function of non-Technical Specification equipment designated as risk significant for greater than 24 hours. The Phase 2 analysis determined that this finding was potentially greater than green; therefore, a Phase 3 analysis was performed by a regional senior reactor analyst (SRA). The SRA determined the change in risk through use of the plant specific risk model. The function of the wet well vents was modeled, but the model did not include the ability to supply air manually to the air operated valve as a backup to the control room switches. A human reliability analysis was performed, and model adjustments were made so the performance deficiency's impact could be analyzed, given the backup method was available. This backup method's availability resulted in the findings risk increase to be low enough to be considered a Green SDP item. A cross-cutting aspect was not identified because the finding does not represent current performance.

Inspection Report# : [2010008](#) (*pdf*)

Significance:  Jan 21, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Perform Appropriate Corrective Actions for Deficiencies with Opening a Service Water Valve

Green. The team identified a non-cited violation of Technical Specification (TS) 5.4.1, Procedures, for the licensee's failure to maintain adequate abnormal operating procedures (AOP) for opening a service water cross-tie valve during a loss of offsite power (LOOP) event. The valve would not open against system differential pressure (dp) and the licensee's corrective actions did not address the valve's manipulation in AOPs. The licensee entered the issue into their corrective action program as NCR 428809.

After discovering the difficulty of opening the service water cross-tie valves against a maximum differential pressure, the licensee's failure to provide appropriate procedural guidance to assure the operation of the valves during a LOOP event was a performance deficiency. The performance deficiency was more than minor because it is associated with the mitigating systems cornerstone attribute of equipment performance and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences because the SW-V146 valve would not open against a system pressure of 75 psid; and, if this condition was left uncorrected, the ability to complete required operator actions in procedures OAOP18.0 and OAOP36.1 during a LOOP would be adversely affected. Using Manual Chapter Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the inspectors determined the finding required a Phase 2 analysis because the finding represented an actual loss of safety function of non-Technical Specification equipment designated as risk significant for greater than 24 hours. The Phase 2 analysis determined that this finding was potentially greater than green; therefore, a Phase 3 analysis was performed by a regional senior reactor analyst (SRA). The SRA determined the combined risk associated with the valve's function to provide alternate flow to safety-related heat exchangers was very low. In addition, there was a good chance of operator recovery due to the long time period that was available before manipulation of the valve was required. These factors resulted in a risk value corresponding to a Green finding. The finding directly involved the cross-cutting aspect of thoroughness of evaluation within the Corrective Action Program component of the Problem Identification and Resolution area [P.1(c)].
Inspection Report# : [2010008](#) (*pdf*)

Barrier Integrity

Significance:  Sep 30, 2011

Identified By: Self-Revealing

Item Type: FIN Finding

Inadequate Maintenance Results in Containment Isolation Valve Failure

A self-revealing Green finding was identified for inadequate maintenance on the overload relay of the unit 2 reactor water cleanup (RWCU) system inlet isolation valve 2-G31-F001. As a result of the inadequate maintenance, the overload relay actuated during operation of the valve under normal conditions, and the valve failed to shut. This was revealed while operators were attempting to isolate the RWCU system on August 2, 2011. After the valve failed to fully shut on August 2, 2011, the licensee shut the valve in series with 2-G31-F001 (2-G31-F004), repaired the overload relay for the 2-G31-F001 valve by installing the correct fasteners, returned the 2-G31-F001 valve to service, and entered the issue into their corrective action program (AR #480063).

The inadequate maintenance on the 2-G31-F001 valve overload relay was a performance deficiency. The finding was more than minor because it was associated with the Barrier Integrity cornerstone attribute of structure, system, and component (SSC) and Barrier Performance, and it affected the associated cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, the finding prevented a primary containment isolation valve from shutting. This finding was evaluated using Inspection Manual Chapter 0609, Significance Determination Process, Phase 1 Worksheet for Containment Barriers. The finding was determined to be of very low safety significance (Green) because the finding: 1) did not only represent a degradation of the radiological barrier function provided for the control room, auxiliary building, spent fuel pool, or the standby gas treatment system, 2) did not represent a degradation of the barrier function of the control room against smoke or a toxic atmosphere, and 3) did not represent an actual open pathway in the physical integrity of reactor containment. The cause of this finding has no cross-cutting aspect because the maintenance took place in 1992 and is not indicative of current licensee performance.

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

Emergency Preparedness

Occupational Radiation Safety

Significance: G Mar 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to follow procedures for analyzing radiological air samples for the presence of alpha emitters

The inspectors identified a non-cited violation (NCV) of Technical Specification (TS) 5.4.1, Procedures, for the failure of the licensee to perform initial alpha activity analysis of air samples indicating greater than 0.3 Derived Air Concentration (DAC) beta-gamma activity on an approved alpha counter. Section 9.5.12.h of procedure HPS-NGGC-0024, Alpha Monitoring Guidelines, Rev. 3, states that if gamma scan results indicate the airborne activity is equal to or greater than the beta-gamma DAC-Fraction Action level of 0.3 DAC; (1) perform an initial alpha count on the air sample using a counter approved for air samples; and (2) assess and document the results per site-specific procedures. Contrary to this requirement, on March 10, 11, and 21, 2011, the licensee did not perform an initial alpha count on air samples using a counter approved for air samples and assess and document the results for gamma scan results that exceeded 0.3 DAC. Specifically, air samples for those selected work activities identified DAC concentrations of 0.6589, 0.3152 and 1.45. Licensee corrective actions included instructions to workers to ensure procedural adherence for sample analysis and changes to the software program to prompt the workers to do the sample analysis when the threshold limits were met or exceeded. The licensee entered the issue into its corrective action program as NCR 455307.

This finding is greater than minor because it was associated with the Occupational Radiation Safety Cornerstone attribute of Program and Process (Monitoring and Radiation Protection Controls) and adversely affects the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation from airborne radioactive material during routine civilian nuclear reactor operation. Failure to identify potentially significant contributors to internal dose could lead to unmonitored occupational exposures. The finding was evaluated using IMC 0609, Appendix C, "Occupational Radiation SDP" and was determined to be of very low safety significance (Green) because it was not related to As Low As Reasonably Achievable (ALARA) Planning and the ability to assess dose was not compromised during these instances. In addition, it did not involve overexposure or substantial potential for overexposure because of the relatively low alpha source term in the areas where the surveys were performed. This conclusion was drawn from the results of beta/gamma and alpha smear surveys performed at those selected work locations. However, if left uncorrected, unmonitored internal exposure could have occurred. The cause of this finding was directly related to the cross-cutting aspect of maintaining effective interfaces between work groups in the Work Control component of the Human Performance area. [H.3(b)]. (Section 2RS1)

Inspection Report# : [2011002](#) (*pdf*)

Public Radiation Safety

Physical Protection

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

Miscellaneous

Last modified : March 02, 2012