

# Braidwood 2

## 3Q/2009 Plant Inspection Findings

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### Initiating Events

**Significance:**  Sep 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

#### **failure to Provide Continuous Monitoring of a Fire Door (1R05.1.b.(1))**

The inspectors identified a NCV of Braidwood Operating License Condition 2.E, "Fire Protection Program," for the licensee's failure to take adequate compensatory measures following the failure of electronic supervision of a fire door. Specifically, when continuous electronic supervision of a fire door in an area with gaseous fire suppression failed, the licensee did not establish an hourly fire watch as required by Procedure BwAP 1110-1, "Fire Protection Program System Requirements." The inspectors determined that the licensee failed to take procedurally required compensatory measures for the loss of electronic fire door monitoring. Upon notification of these requirements by the inspectors, the licensee restored power to the system and entered the issue into the CAP as Issue Report (IR) 945777.

The inspectors determined the finding is more than minor because it is associated with the external events (fire) attribute of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors determined the finding category was Fire Prevention and Administrative Controls and assigned a low degradation rating. Therefore, the finding screened as of very low safety significance. The cause of the finding is related to the work practices attribute of the cross-cutting element of Human Performance (H.4(b)). Specifically, procedures were in place that directed the appropriate compensatory measures for the loss of electronic monitoring of fire doors; however, the licensee did not implement those procedures. (Section 1R05.1.b.(1))

Inspection Report# : [2009004](#) (*pdf*)

**Significance:**  Mar 31, 2009

Identified By: Self-Revealing

Item Type: FIN Finding

#### **REACTOR TRIP ON UNIT AUXILIARY TRANSFORMER 241-1 SUDDEN PRESSURE RELAY ACTUATION DUE TO 2C HEATER DRAIN PUMP MOTOR ELECTRICAL FAULT**

A Green finding was self-revealed on December 27, 2008, when excessively long motor leads caused a phase to phase overcurrent trip of the 2C heater drain pump and subsequent Unit 2 reactor trip. Specifically, adequate procedural guidance on re terminating the 2C heater drain pump motor leads following refurbishment was not provided, which resulted in excessive motor lead length. This issue was entered into the licensee's corrective action program as Issue Report (IR) 860458. Since the procedures that govern activities on equipment that is not used to prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public, such as the heater drain pump, this finding does not represent a violation of regulatory requirements. The inspectors determined the finding was more than minor because it impacted the procedure quality attribute of the Initiating Events 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. The inspectors determined the issue was of very low safety significance because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions would not be available. There is no cross-cutting aspect associated with this finding because the development of the inadequate procedure did not reflect current performance.

Inspection Report# : [2009002](#) (*pdf*)

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### Mitigating Systems

**Significance:** **G** Sep 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure of the Licensee's Staff to Properly Manage On-line Risk Associated with Testing of the 2A Auxiliary Feedwater Pump Slave Relays.**

The inspectors identified a NCV of 10 CFR Part 50.65 (a)(4), due to the licensee's failure to properly assess and manage the risk associated with scheduled slave relay testing for the 2A Auxiliary Feedwater (AF) system. Specifically, the licensee declared the system inoperable but available. However, the system at the time could neither automatically respond to an event, nor was an operator "dedicated" as defined in the NRC endorsed industry guidance, Nuclear Management and Resources Council (NUMARC) 93-01, to manually realign the system to perform its safety-related function for the system to be considered available. Corrective actions for this issue included assigning dedicated operators in accordance with NUMARC 93-01, Section 11. The inspectors did not identify a cross-cutting aspect for this issue.

The finding is more than minor because there was elevated plant risk associated with the 2A AF pump being unavailable that would have required the implementation of additional risk management actions (i.e., assigning dedicated operators and/or maintenance personnel in accordance with NUMARC 93-01, Section 11). The inspectors assessed the safety significance of this finding using IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." Using input from the licensee's risk assessment engineer, the inspectors determined that the actual risk deficit was  $1.5 \times 10^{-7}$ . The finding was determined to be of very low safety significance because the actual risk deficit was determined to be less than  $1 \times 10^{-6}$ . (Section 1R13.1.b)

Inspection Report# : [2009004](#) (pdf)

**Significance:** **G** Jun 30, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

**ISOLATION OF LOWER CABLE SPREADING ROOM CARBON DIOXIDE FIRE SUPPRESSION**

A Non-Cited Violation of License Condition 2.E, "Fire Protection Program," was self-revealed when the automatic carbon dioxide (CO<sub>2</sub>) fire suppression system was isolated from the Unit 1 and Unit 2 Lower Cable Spreading Rooms from July 23, 2007, through August 11, 2008. Specifically, the licensee identified that a modification to the Upper Cable Spreading Room CO<sub>2</sub> system, on July 23, 2007, had inadvertently isolated the CO<sub>2</sub> system to the LCSRs. The licensee entered the deficiency with the automatic carbon dioxide fire suppression system into their corrective action program and installed a modification to return the LCSR CO<sub>2</sub> system to service. The finding was determined to be more than minor because the design control attribute of the mitigating systems cornerstone was impacted. The inspectors determined this finding to be of very low safety significance based on the Phase 2 SDP evaluation in accordance with IMC 0609, Appendix F, "Fire Protection SDP." This finding is related to the cross-cutting area of Human Performance associated with the attribute of resources (H.2(c)).

Inspection Report# : [2009003](#) (pdf)

**Significance:** **SL-IV** Jun 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**FAILURE TO PERFORM APPROPRIATE 10 CFR 50.59 REVIEW**

The inspectors identified a Severity Level IV NCV of 10 CFR 50.59 following a review of changes made to TS required surveillance test procedures. These procedures allowed testing of Reactor Protection System analog channels in the bypassed conditions by use of jumpers during surveillance test. This technique had been deemed unacceptable in NRC safety evaluation report for Westinghouse Topical Report WCAP 10271.

This issue involves traditional enforcement because it involves a violation of 10 CFR 50.59 and is more than minor because there was a reasonable likelihood that the change would require NRC review and approval prior to its implementation. This issue did not represent an actual loss of safety function for greater than the TS allowed outage time; therefore it was of very low safety significance. Consequently, the finding is categorized as a Severity Level IV NCV in accordance with the NRC Enforcement Policy. There were no cross-cutting aspects identified by the inspectors. This finding was documented in the licensee's corrective action program. Corrective actions included changing the method of reactor trip system testing.

Inspection Report# : [2009003](#) (pdf)

**Significance:**  Jun 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**FAILURE TO PROPERLY EVALUATE INSTALLATION OF ECCS THROTTLE VALVES**

A NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for failure to install a modified Emergency Core Cooling System throttle valve design commensurate with the design control measures applicable to the original design. This resulted in the failure to select a material suitable to the application. Specifically, the licensee selected a design that included gas nitrided surfaces, contrary to the Westinghouse design specification for the original emergency core cooling system throttle valves that prohibited the use of nitrided surfaces in reactor coolant applications. Corrective actions included replacing the Emergency Core Cooling System throttling valve that showed worst flow degradation. Additionally the licensee re-performed the surveillance test and adjusted the throttle valves such that any future degradation of the flow area (caused by corrosion or brazing material loss) will not result in pump run-out. The finding was determined to be more than minor because it was similar to Example 5.a of IMC 0612, Appendix E, "Examples of Minor Issues," in that a modification that did not meet design requirements was returned to service prior to discovery. The inspectors determined the issue did not result in the actual loss of a safety function and the issue screened out as having very low safety significance. This finding has a cross cutting aspect in the area of Problem Identification and Resolution associated with the corrective action program attribute, because the licensee did not thoroughly evaluate all aspects of the modification to the ECCS throttle valves. (P.1(c))

Inspection Report# : [2009003](#) (pdf)

**Significance:**  Jun 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**FAILURE TO PROMPTLY IDENTIFY BRYOZOA INFESTATION CAUSED 2A SX SUBSYSTEM TO BE INOPERABLE**

The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action Program," associated with the licensee's failure to promptly identify that the 2A Essential Service Water (SX) subsystem was inoperable and hence, entry into Braidwood Improved Technical Specification (TS) 3.7.8, "Essential Service Water (SX) System, Condition A was appropriate. Following the failure of the Unit 1A SX pump due to indications of discharge strainer fouling from Bryozoa infestation in the lake screenhouse the operators failed to properly evaluate possible common mode failures associated with the 2A SX subsystem. This resulted in an approximately 45 hour delay in recognizing that the 2A SX subsystem was inoperable and therefore delayed actions to recover the subsystem. The licensee entered this performance deficiency into their corrective action program. The finding is greater than minor because the lack of prompt identification of the common failure affected the Mitigating Systems Cornerstone objective of ensuring the availability, capability and reliability of the Unit 1 and Unit 2 SX trains to respond to initiating events to prevent undesirable consequences. The finding is of very low safety significance because based on the results of an analysis performed by the licensee, which concluded that, even under severely degraded flow conditions, the affected trains of SX would have provided sufficient cooling to components served by the SX system following a reactor trip, a loss of coolant accident, or a loss of offsite power. The primary cause of the finding was related to the cross-cutting element of Human Performance and the associated attribute of decision making (H.1(b)).

Inspection Report# : [2009003](#) (pdf)

**Significance:**  Jun 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**BRYOZOAN INFESTATION AT THE LAKE SCREENHOUSE CIRCULATING WATER FOREBAYS**

The inspectors identified a NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action Program," having very low safety significance, associated with the licensee's failure to identify a significant condition adverse to quality and to develop corrective actions to prevent recurrence. Specifically, the licensee failed to identify the October 2005 bryozoa infestation as a significant condition adverse to quality and did not establish corrective actions to preclude

recurrence. This was evidenced by the September 2008 accumulation of bryozoan colonies in the SX and Circulating Water System forebays that resulted in the SX system strainer plugging and hence represented a challenge to the reliability and operability of the SX system. The licensee entered this performance deficiency into their corrective action program. The finding is greater than minor because the failure to identify the significant condition adverse to quality and to develop corrective actions to prevent recurrence affected the Mitigating Systems Cornerstone objective of ensuring the availability, capability and reliability of the Unit 1 and Unit 2 SX trains to respond to initiating events to prevent undesirable consequences. The finding is of very low safety significance because based on the results of an analysis performed by the licensee, which concluded that, even under severely degraded flow conditions, the affected trains of SX would have provided sufficient cooling to components served by the SX system following a reactor trip, a loss of coolant accident, or a loss of offsite power. The primary cause of the finding was related to the cross-cutting element of Human Performance and the associated attribute of decision making (H.1(b)).

Inspection Report# : [2009003](#) (pdf)

**Significance:**  Mar 31, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

### **SAFETY INJECTION PIPE SUPPORT DEFICIENCIES**

A finding of very low safety significance and an associated NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the licensee's failure to properly evaluate the addition of lead shielding to Unit 2 safety injection piping. Specifically, the licensee did not have sufficient rationale and incorrectly concluded that sufficient margin existed in the pipe support design with the additional weight. The licensee entered the issue into their corrective action program, revised associated calculations, and planned modifications as needed to restore required design margins. The finding was determined to be more than minor because compliance with Seismic Category I design requirements was necessary to ensure the Subsystem 2SI06 pipe supports would function as required during a Seismic Category I design basis event. The finding screened as having very low safety significance because the design deficiency was confirmed not to result in loss of operability of the safety injection pipe supports. The cause of the finding is related to the cross-cutting component of Human Performance, Resources, because the licensee did not maintain adequate design margins (H.2(a)).

Inspection Report# : [2009002](#) (pdf)

**Significance:**  Mar 06, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Take Effective Corrective actions to Maintain Capability of foam Suppression Systems**

A finding of very low safety significance and associated NRC of License Condition 2.E was identified by the inspectors for the licensee's failure to promptly correct an item adverse to quality. Specifically, although there was evidence of leakage from the diaphragm for the foam concentrate tank for the 2A and 2B diesel oil storage tank room fire suppression systems which could adversely affect suppression capability, the licensee failed to thoroughly evaluate the problem and promptly take corrective action. The licensee subsequently entered the issue into their corrective action program, declared the systems inoperable, and planned to replace the diaphragm.

The finding was determined to be more than minor because the evidence of leakage resulted in reasonable doubt with respect to the functionality of the foam suppression systems. The issue was of very low safety significance because a fire involving a diesel oil storage tank room would only affect the associated emergency diesel generator and no other equipment would be affected.

Inspection Report# : [2009006](#) (pdf)

**Significance:**  Dec 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate Control of High Pressure Gas Cylinders**

A finding of very low safety significance and an associated non-cited violation of 10 CFR Part 50, Appendix B,

Criterion III, Design Control, was identified by the inspectors for the failure to properly control high pressure gas cylinders in proximity to safety-related equipment. The licensee entered this into their CAP and made the restraint of the gas cylinders seismically qualified.

The inspectors determined that the failure to properly evaluate the installation and storage of high pressure gas cylinders in plant area AB-401 and AB 426 was contrary to the design basis and was a performance deficiency. The finding was more than minor because the finding was similar to IMC 0612, Appendix E, Example 4a, in that no engineering evaluation was performed to assess the seismic impact on the gas cylinders, where safety related equipment was potentially effected. Therefore, this performance deficiency also impacted the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors performed a phase 1 significance determination process screening and the finding was determined to be potentially risk significant due to external initiating event core damage sequences. The regional SRA determined that the Phase 2 SDP pre solved tables/worksheets did not clearly address the inspection finding. Therefore, the SRA performed an SDP Phase 3 analysis and determined the issue was of very low safety significance.

Inspection Report# : [2008005](#) (pdf)

**Significance:**  Dec 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

**Inadequate Corrective Action for Containment Spray Add Tank Drain Drain Valve**

A Green finding and associated non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, was self-revealed when leak-by of valve 2CS023 led to a 100 gallon sodium hydroxide (NaOH) spill that leaked into the 2A RH pump room and rendered the 2A RH pump unavailable on September 30, 2008. The licensee failed to take adequate corrective actions to address previous leak-by of valve 2CS023. This finding has a cross-cutting aspect in the area of human performance (H.4(a)).

The inspectors determined that the failure to properly verify the adequacy of lubricating the 2CS023 valve stem for better valve operation was a performance deficiency. The finding was more than minor because it impacted the mitigating systems cornerstone attribute to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors performed a Phase 1 SDP review of this finding and determined the issue was of very low safety significance. (Section 1R15)

Inspection Report# : [2008005](#) (pdf)

**Significance:**  Oct 24, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to take timely corrective action for a previously identified NRC violation.**

The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, for failure to take timely corrective actions to address a previously issued NCV regarding the substitution of manual actions for automatic actions on the A train auxiliary feedwater pumps. Specifically, the licensee did not perform a full evaluation in accordance with 10 CFR 50.59 for the addition of new Step, 2.c, in Revision 101 of Abnormal Operating Procedure 1/2BwOA-ELEC-4, "Loss of Offsite Power," which instructed operators to place the A train auxiliary feedwater pumps in pull-out position. This violation was originally identified by NRC inspectors in January 2007. The inspection team identified that the licensee had not taken timely actions to correct the violation.

This finding was considered to be more than minor because it impacted the procedure quality attribute of the mitigating systems cornerstone. As a result, the inspectors completed a Phase 1 Significance Determination Process Screening in accordance with IMC 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations." The inspectors answered 'no' to all of the Mitigating Systems Cornerstone questions in Table 4a of IMC 0609, Attachment 4, and determined the issue to be of very low safety significance, Green. This issue of untimely corrective actions was entered into the licensee's corrective action program, and the licensee took immediate corrective actions by issuing Revision 104 to 1/2BwOA-ELEC-4, which removed Step 2.c until the full 50.59 evaluation was completed.

## Barrier Integrity

**Significance:**  Sep 30, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Failure of Fire Protection Valve Stroke Procedure Results in Trip of B Train of Main Control Room Ventilation.**

A NCV of 10 CFR 50, Appendix B, Criterion V, was self-revealed on September 22, 2009, when performance of a fire protection valve stroke procedure resulted in a trip of the B Train of the Main Control Room Ventilation System. Specifically, conflicting procedural guidance resulted in operators stroking the B Train Main Control Room Recirculation Charcoal Absorber deluge valve, which resulted in an unexpected trip of the safety-related B train of Main Control Room Ventilation and entry into Technical Specifications (TS) 3.7.10 and 3.7.11. The licensee conducted trainings and briefings to the operators to identify the potential error traps in procedures and entered this issue into the corrective action program (CAP) as IR 968717.

The finding is more than minor because it affected the procedure quality attribute of the Barrier Integrity Cornerstone objective to maintain the radiological barrier functionality of the control room. The inspectors answered 'No' to all questions in the Containment Barrier Column of IMC 0604, Attachment 4, Table 4a, "Characterization Worksheet for IE, MS, and BI Cornerstones," and the finding screened as having very low safety significance. This finding is associated with the cross-cutting attribute of decision making in the Human Performance cross-cutting component (H.1(a)). Specifically, when faced with uncertainty in procedural direction during performance of the fire protection valve surveillance, the licensee did not use a systematic process for decision making, which resulted in a trip of the B Train of Main Control Room Ventilation. (Section 1R05.1.b.(2))

Inspection Report# : [2009004](#) (pdf)

**Significance:**  Dec 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate Corrective Action for Failure to Promptly Correct Auxiliary Tunnel Feedwater tunnel Hatch Cover Design Deficiencies**

A finding of very low safety significance and associated non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the inspectors for failure to promptly identify and correct the auxiliary feedwater tunnel hatch cover design deficiencies. Specifically, upon finding a design deficiency, the licensee failed to evaluate and correct all deficiencies associated with the design calculation in a timely manner. The licensee has entered the issue into their corrective action program, implemented compensatory measures using temporary modifications, and plans to complete permanent modifications to restore design margins by December 31, 2008.

The finding was more than minor because it was associated with the Barrier Integrity cornerstone attribute of SSC and Barrier Performance (Containment Isolation SSC Reliability) and affected the cornerstone objective of maintaining functionality of containment. The inspectors determined the finding to be of very low safety significance (Green) using the SDP Phase 1 screening worksheets as there was no actual open pathway in the physical integrity of the reactor containment. This finding has a cross-cutting aspect in the area of problem identification and resolution, corrective action program (CAP), because the licensee did not thoroughly evaluate the problem immediately upon identification. (P.1(c.)) (Section 1R15)

Inspection Report# : [2008005](#) (pdf)

**Significance:**  Dec 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Analyze Inlet Piping Loads and Establish an Adequate HUT Quench Volume**

The inspectors identified an NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance, associated with the licensee's failure to analyze and establish an adequate quench volume within the boron recycle system holdup tanks and failure to analyze the water hammer loads on boron recycle system holdup tank inlet piping induced by relief valve discharges. Insufficient holdup tank quench volume could result in an overpressure failure of the holdup tank and the water hammer induced piping loads could damage the boron recycle system holdup tank inlet piping system. The licensee corrective actions included changing procedures to maintain a minimum 40 percent boron recycle holdup tank level as a quench volume for system relief valves and initiating an action to perform an analysis to investigate the magnitude of the potential water hammer loads on the inlet piping.

The finding was more than minor because the finding affected the Barrier Integrity Cornerstone objective for maintaining the Radiological Barrier Function of the Containment. The finding was associated with the design control and procedure quality attributes of the Barrier Integrity Cornerstone. The inspectors determined that the failure to establish an adequate boron recycle system holdup tank quench volume and analyze the magnitude of water hammer loads on boron recycle system holdup tank inlet piping degraded the Radiological Barrier Function of the Containment but did not represent an actual open pathway from containment; therefore, the finding screened as having very low safety significance (Green). The inspectors determined that the finding did not have a cross-cutting aspect. (Section 4OA2.5.b.1)

Inspection Report# : [2008005](#) (*pdf*)

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## **Emergency Preparedness**

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## **Occupational Radiation Safety**

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## **Public Radiation Safety**

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## **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.

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## **Miscellaneous**

**Significance:** N/A Oct 24, 2008

Identified By: NRC

Item Type: FIN Finding

### **PI&R Report Summary**

The team concluded that the implementation of the Corrective Action Program (CAP) at Braidwood was generally good. The licensee had a low threshold for identifying problems and entering them in the CAP. Items entered into the CAP were screened and prioritized in a timely manner using established criteria; were properly evaluated commensurate with their safety significance; and corrective actions were generally implemented in a timely manner,

commensurate with their safety significance. The team noted that the licensee was adequate at reviewing and applying industry operating experience lesson learned. Audits and self-assessments were also noted to be acceptable. On the basis of interviews conducted during the inspection, workers at the site expressed freedom to enter safety concerns into the CAP, exhibiting a good safety conscience work environment.

Inspection Report# : [2008009](#) (*pdf*)

Last modified : December 10, 2009