

# Braidwood 2

## 4Q/2009 Plant Inspection Findings

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### Initiating Events

**Significance:**  Dec 31, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

#### **FAILURE TO FULLY IMPLEMENT ABNORMAL OPERATING PROCEDURES FOLLOWING A SEISMIC EVENT**

The inspectors identified a Green finding and an associated Non-Cited Violation of Technical Specification 5.4.1 for the failure to fully implement an abnormal procedure following a seismic event. Specifically, on April 18, 2008, following a seismic event, the licensee chose to perform field walkdowns to verify that sulfuric acid and sodium hypochlorite tanks were intact rather than to isolate control room ventilation as required by Procedure 0BwOA ENV-4, "Earthquake." As a corrective action, the licensee performed training activities to clarify when procedural deviations are allowed. The finding was determined to be 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 evaluated the finding in accordance with IMC 0612, Appendix B, "Issue Screening." The inspectors performed a significance evaluation in accordance with IMC 0609, Attachment 4, "Determining the Significance of Reactor Inspection Findings for At-Power Situations." The inspectors answered 'No' to the external event initiators question in the Initiating Events Cornerstone column of Table 4a and the issue screened as one of 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(b)). Specifically, the licensee did not use conservative assumptions in the decision to send an operator to locally verify rather than perform a procedural step from the control room as written. In the event the sulfuric acid and sodium hypochlorite tanks were damaged, the control room operators could have been impacted with chlorine gas prior to receiving verification from the locally dispatched operator since the licensee elected not to isolate control room ventilation.

Inspection Report# : [2009005](#) (*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:**  Dec 31, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

## **FAILURE TO ESTABLISH 2 TO 1 WELD PROFILE ON AF CROSS-TIE DRAIN LINE SOCKET WELDS**

ed Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion V, for the licensee's failure to follow work order instructions and establish a 2-to-1 weld profile on the auxiliary feedwater system cross-tie pipe drain line socket welds. Licensee corrective actions included rejecting the nonconforming welds, establishing interim guidance for the range of acceptable socket weld profiles, and initiating revisions to weld procedures to clarify applicable instructions. The inspectors determined that this finding was more than minor because, if left uncorrected, the failure to properly control maintenance activities could become a more significant safety concern. Specifically, the failure to implement a 2-to-1 socket weld profile could result in a vibration induced pipe fatigue failure affecting the operability of Unit 2 Auxiliary Feedwater System Train "A." This finding was of very low safety significance because it was a design or qualification deficiency, confirmed to not result in loss of operability or functionality. This finding has a cross-cutting aspect in the area of Human Performance, Resources because the licensee did not provide adequate procedural resources (H.2(c)). Specifically, the licensee failed to ensure that the work instruction for the welding contained adequate guidance to implement the required 2-to-1 weld profile.

Inspection Report# : [2009005](#) (*pdf*)

**Significance:**  Dec 31, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

## **FAILURE TO FOLLOW PROCEDURES DURING RESTORATION OF 2SX173**

A Green finding and an associated Non-Cited Violation of Technical Specification 5.4.1 was self-revealed for the failure to follow procedures during the restoration of the essential service water supply valve to the engine driven cooling water pump for the 2B auxiliary feedwater pump (2SX173) following scheduled maintenance. This issue resulted in a water hammer occurring in the essential service water system. The licensee walked down the system to ensure that the essential service water system was not damaged. Additionally, the licensee developed training actions to emphasize procedural adherence. The inspectors determined the finding was more than minor because it impacted the Human Error attribute of the Mitigating System Cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The inspectors performed a significance evaluation in accordance with IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklist for both PWRs and BWRs" Checklist 4, and determined that the finding did not increase the likelihood of a loss of RCS inventory, degrade the licensee's ability to terminate a leak path or add inventory, or degrade the licensee's ability to recover decay heat removal) DHR once it is lost, therefore the issue screened as one of very low safety significance (Green). This finding has a cross cutting aspect in the area of Human Performance, because the work supervisor did not make safety-significant or risk-significant decisions using a systematic process, especially when faced with uncertain or unexpected plant conditions, to ensure safety is maintained (H.1(a)). The supervisor did not seek further guidance surrounding the observed conditions upon arrival at the work site.

Inspection Report# : [2009005](#) (*pdf*)

**Significance:**  Dec 31, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

## **FAILURE TO FOLLOW MAINTENANCE PROCEDURES AND WORK INSTRUCTIONS**

The inspectors identified a Green finding and an associated Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," related to post maintenance testing. Specifically, the licensee failed to follow maintenance procedures and work instructions by performing the post maintenance testing prior to completing work on the 2B Auxiliary Feedwater Pump Essential Service Water cooling water supply. Work that could have affected the operability of safety-related equipment was completed and the system returned to operable status without completing the necessary post maintenance testing. As part of the corrective actions for this issue, the licensee

retested the valve and revised the affected surveillance test procedure.

The inspectors concluded that the finding was more than minor because the licensee returned equipment to an operable status following maintenance without performing required testing. Licensee Procedure MA-AA-716-012, "Post Maintenance Testing," Revision 11, requires that "post maintenance testing shall be performed following any corrective and some preventive maintenance activities on plant equipment that may have impacted the equipment's ability to perform its intended function." The performance of a flow scan may impact the stroke time of a valve, therefore post maintenance testing was required following completion of the flow scan testing. Using the Significance Determination Process Phase 1 worksheet of IMC 0609.04, the inspectors determined the finding affected the Core Decay Heat Removal attribute of the Mitigation Systems Cornerstone. Because subsequent testing confirmed that no loss of operability or functionality existed the finding was determined to be of very low safety significance. The finding has a cross-cutting aspect in the area of Human Performance, Work Control, because the licensee performed work packages out of sequence, thereby allowing a safety system to be returned to service without the required post maintenance testing after completion of all work (H.3.(b)).

Inspection Report# : [2009005](#) (pdf)

**Significance:**  Sep 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

### **FAILURE TO PROVIDE CONTINUOUS MONITORING OF A FIRE DOOR**

tection 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.

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

**Significance:**  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  $1 \times 10^{-6}$ .

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

**Significance:**  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 license'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 nitrated surfaces, contrary to the Westinghouse design specification for the original emergency core cooling system throttle valves that prohibited the use of nitrated 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 Bryozoan 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)

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## **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.

Inspection Report# : [2009004](#) (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

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