

# Browns Ferry 1

## 4Q/2009 Plant Inspection Findings

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### Initiating Events

**Significance:**  Jun 30, 2009

Identified By: NRC

Item Type: FIN Finding

#### **Untimely actions to resolve excessive IBC system condensation results in U1 reactor scram**

A Green self-revealing finding was identified for a failure to implement corrective actions in a timely manner to address excessive isophase bus cooling system condensation that resulted in a Unit 1 reactor scram caused by water accumulation in the isophase bus ductwork, which created an electrical ground fault on the main generator isophase busses. This event was entered into the licensee's corrective action program as PER 163815.

This finding was determined to be greater than minor because it was associated with the Initiating Event Cornerstone attribute of Equipment Performance, and adversely affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during at power operations. The finding was evaluated using Phase 1 of the At-Power SDP, and was determined to be of very low safety significance (Green) because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigating equipment or functions were not available. The cause of this finding was directly related to the cross-cutting aspect of appropriate and timely corrective actions in the area of Problem Identification and Resolution because the license had identified an abnormal equipment condition related to excessive IBC system condensation for which immediate actions were specified but not carried out (P.1.d). (Section 4OA3.2)

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

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### Mitigating Systems

**Significance:**  Oct 09, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

#### **Deficiencies with Emergency Lighting Units**

The team identified a Green non-cited violation of Browns Ferry Units 1, 2, and 3 Operating License Conditions 2.C(13), 2.C(14), and 2.C(7), respectively, for the licensee's failure to maintain in effect all provisions of the NRC-approved fire protection program, as described in the Final Safety Analysis Report. The Fire Protection Report (referenced in the Final Safety Analysis Report) requires that measures be established to ensure that conditions adverse to fire protection, such as failures and deficiencies, are promptly identified and corrected. The licensee had not established measures to identify and correct an excessive number of Appendix R emergency lighting unit failures. Specifically, emergency lighting unit failures were not being entered in the corrective action program as problem evaluation reports in order to evaluate and resolve why many of the emergency lighting failures occurred prior to reaching their 6-year replacement date. Additionally, the Fire Protection Report surveillance requirement to replace the Appendix R emergency lighting unit batteries and lamp heads every six years was not being adequately implemented, in that licensee data revealed that several installed emergency lighting units were beyond their 6-year replacement date. The licensee entered this finding into their corrective action program and initiated corrective actions to address these issues.

The licensee's failure to meet the Fire Protection Report requirements to establish measures to identify and correct a condition adverse to fire protection (excessive Appendix R emergency lighting unit failures); and, to implement the Appendix R emergency lighting system replacement program, is a performance deficiency. The finding is more than

minor because it is associated with the reactor safety, mitigating systems cornerstone attribute of protection against external factors (i.e., fire). The excessive emergency lighting unit failures affected the objective of ensuring the reliability and capability of operator manual actions during response to initiating events, The team determined that this finding was of very low safety significance (Green) because the operators had a high likelihood of completing the tasks using flashlights. The cause of this finding has a cross-cutting aspect in the Work Control component of the Human Performance area, in that it was directly related to the licensee not planning and coordinating work activities to support long-term equipment reliability, and their maintenance scheduling was more reactive than preventive (H.3 (b))

Inspection Report# : [2009009](#) (pdf)

**Significance:**  Oct 09, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Establish Adequate Compensatory measures for an Out-of-Service Hose Station**

The team identified a Green non-cited violation of Browns Ferry Units 1, 2, and 3 Operating License Conditions 2.C (13), 2.C(14), and 2.C(7), respectively, for the licensee's failure to maintain in effect all provisions of the NRC-approved fire protection program as described in the Final Safety Analysis Report. The Fire Protection Report (referenced in the Final Safety Analysis Report) requires the licensee to establish adequate compensatory measures for degraded or inoperable fire protection equipment. The licensee failed to establish adequate compensatory measures for an out-of-service hose station, in that the staged additional lengths of hose connected to the closest in-service hose station, established as a compensatory measure, did not provide equal or better protection than the out-of-service hose station that it was replacing. The licensee entered this finding into their corrective action program and took immediate action to review all existing fire protection impairment permits for similar problems. The licensee removed the compensatory measure and restored the out-of-service hose station to service.

The licensee's failure to provide compensatory measures of equal or better protection for an out-of-service hose station is a performance deficiency because it did not meet the requirements of the approved fire protection program. The finding was more than minor because it affected the protection against external factors attribute of the mitigating systems cornerstone, in that it impacted manual fire suppression (i.e., fire brigade) capability; and, affected the cornerstone objective of ensuring the availability of systems that respond to initiating events. Since Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," does not provide guidance for assigning a degradation rating to manual fire suppression, this determination was made using qualitative methods which received NRC management review as provided for in Inspection Manual Chapter 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria." This finding was determined to be of very low safety significance (Green) because it represented a low degradation of the manual fire suppression function. Although the fire protection impairment permit had been implemented for an out-of-service hose station, the hose station was still functional at the time this issue was identified, because the water supply to the hose station had not been physically isolated. However, the team concluded the fire brigade would have experienced delays in initiating manual fire suppression for a fire in a fire area covered by the impairment. The cause of this finding has a cross-cutting aspect in the Work Control component of the Human Performance area, in that it was directly related to the licensee not planning and coordinating work activities, consistent with nuclear safety, to ensure that adequate compensatory actions were established for an out-of-service hose station (H.3 (a)).

Inspection Report# : [2009009](#) (pdf)

**Significance:** TBD Oct 09, 2009

Identified By: NRC

Item Type: AV Apparent Violation

### **Failure to Protect Cables of Systems Necessary to Achieve and/or Maintain Post-Fire Safe Shutdown Conditions for Fire Areas Subject to the Requirements of 10 CFR Part 50, Appendix R, Section 111.G.2.**

The team identified an apparent violation of Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Appendix R, Section 111.G.2, for the licensee's failure to ensure one of the redundant trains of cables and equipment required for safe shutdown and located in the same fire area was free of fire damage. Specifically, cables associated with equipment required for safe shutdown had not been protected by one of the methods specified in 10 CFR Part 50, Appendix R, Section 111.G.2 (i.e., use of spatial separation, passive barriers, and fire detection and an automatic fire suppression system). This apparent violation applies to Browns Ferry Units 1, 2, and 3, and resulted from review and closure of two unresolved items which were opened in previous inspections. The licensee entered this apparent

violation into their corrective action program and posted additional compensatory measures while long term corrective actions are being implemented.

Failure to protect one train of cables and equipment necessary to achieve post-fire safe shutdown from fire damage, as required by 10 CFR Part 50, Appendix R, Section III.G.2, is a performance deficiency. This finding is more than minor because it is associated with the reactor safety mitigating system cornerstone attribute of protection against external events (i.e., fire). Failure to protect safe shutdown cables and equipment from fire damage affects the reactor safety mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team performed a significance determination process Phase 1 screening. Given the likely impact of the risk contribution arising from the assessment of multiple fire areas, Region II senior reactor analysts performed a Phase 3 significance determination, which resulted in a preliminary risk of Greater Than Green. The team determined that this apparent violation did not present an immediate safety concern because the licensee implemented compensatory measures while long-term corrective actions are being implemented. The compensatory measures included operator manual actions to mitigate or prevent damage to equipment necessary for safe shutdown in the event of a fire. The licensee also implemented fire watches as additional compensatory measures to mitigate the safety hazard. Subsequent to the onsite inspection, the licensee evaluated the most critical operator manual actions, and revised selected safe shutdown instructions to include steps for independent confirmation of operator manual actions in order to improve the likelihood of success of these steps, and thus reduce the risk associated with this apparent violation. The cause of this finding has a cross-cutting aspect in the Corrective Action Program component of the Problem identification and Resolution area, in that the licensee did not take appropriate corrective actions to address the issue in a timely manner, commensurate with the safety significance (P.1.(d)).

Inspection Report# : [2009009](#) (*pdf*)

**Significance: TBD** Oct 09, 2009

Identified By: NRC

Item Type: AV Apparent Violation

**Failure to Meet the Requirements of 10 CFR Part 50, Appendix R, Section 111.G.1 for 20 Fire Areas**

The team identified an apparent violation of Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Appendix R, Section III.G.1, for the licensee's failure to ensure that one train of cables and equipment necessary to achieve and maintain hot shutdown conditions was free of fire damage in 20 fire areas. In addition, these cables had not been protected by one of the methods specified in Appendix R, Section III.G.2 (i.e., use of spatial separation, passive barriers, and fire detection and an automatic suppression system). This apparent violation applies to Browns Ferry Units 1, 2, and 3, and resulted from review and closure of two unresolved items which were opened in previous inspections. The licensee entered this finding into their corrective action program and posted additional compensatory measures while long term corrective actions are being completed.

Failure to meet the requirements of 10 CFR Part 50, Appendix R, Section III.G.1 is a performance deficiency. It is more than minor because it is associated with the reactor safety mitigating system cornerstone attribute of protection against external events (i.e., fire). Failure to ensure that one train of safe shutdown cables and equipment was free of fire damage affects the reactor safety mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events. This finding was evaluated in accordance with NRC Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process." The team performed a significance determination process Phase 1 screening. Given the likely impact of the risk contribution arising from the assessment of multiple fire areas, Region II senior reactor analysts performed a Phase 3 significance determination, which resulted in a preliminary risk of Greater Than Green. The team determined that this apparent violation did not present an immediate safety concern because the licensee implemented compensatory measures while long-term corrective actions are being implemented. The compensatory measures included operator manual actions to mitigate or prevent damage to equipment necessary for safe shutdown in the event of a fire. The licensee also implemented fire watches as additional compensatory measures to mitigate the safety hazard. Subsequent to the onsite inspection, the licensee evaluated the most critical operator manual actions, and revised selected safe shutdown instructions to include steps for independent confirmation of operator manual actions in order to improve the likelihood of success of these steps, and thus reduce the risk associated with this apparent violation. The cause of this finding has a cross-cutting aspect in the Corrective Action Program component of the Problem Identification and Resolution area, in that the licensee did not identify and thoroughly evaluate the problem, and the resolution did not address causes and extent of condition (P.1 (c)).

Inspection Report# : [2009009](#) (*pdf*)

**Significance:** TBD Oct 09, 2009

Identified By: NRC

Item Type: AV Apparent Violation

**Inadequate Safe Shutdown Instruction Entry Conditions for Appendix R Fire Events**

The team identified an apparent violation of Technical Specification 5.4.1.a., in that, the licensee's revision to the safe shutdown instruction entry conditions in December 2008 resulted in inadequate procedural guidance. Specifically, the revision to Procedure 0-SSI-001, "Safe Shutdown Instructions," added an entry condition based on the operator's ability to restore and maintain reactor water level above +2 inches on the narrow range scale, utilizing available equipment. This revision could have delayed or prevented entry into the safe shutdown instructions if reactor water level stayed at or above +2 inches on the narrow range scale. Furthermore, this entry condition was not consistent with the initial plant conditions assumed in the fire protection program safe shutdown analysis. The licensee entered this finding into the corrective action program and revised the entry conditions for the safe shutdown instructions on February 27, 2009, to eliminate the +2-inch reactor vessel water level entry condition.

Failure to meet Technical Specification requirements due to inadequate procedural guidance is a performance deficiency. This finding is more than minor because it is associated with the procedure quality attribute of the mitigating systems cornerstone and the inadequate procedure affected the cornerstone objective of protection against external events such as fire to prevent undesirable consequences. Given the number of fire areas involved, a significance determination process Phase 2 analysis was not performed. A regional senior reactor analyst determined that there were significant obstacles to quantifying the risk of this finding because the methods and tools are not adequate to determine the significance of this finding within the established timeliness goal of 90 days. Therefore, the safety significance of this finding was determined using the guidance and qualitative techniques contained in NRC Inspection Manual Chapter 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria." The preliminary significance of this finding was determined to be Greater Than Green, which was reviewed and approved by NRC management. The team determined that this finding did not present an immediate safety concern because the immediate safety hazard no longer existed after the licensee revised the safe shutdown instruction in February 2009. The cause of this finding had a cross-cutting aspect in the Decision Making component of the Human Performance area, in that it was related to the licensee not using conservative assumptions in decision making and not conducting reviews to verify the validity of underlying assumptions and identifying possible unintended consequences (H.1(b)).  
Inspection Report# : [2009009](#) (*pdf*)

**Significance:**  Jun 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to perform an adequate risk assessment during severe weather conditions**

A Green non-cited violation of 10 CFR Part 50.65 (a)(4), "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," was identified when the licensee failed to consider the impact of severe weather conditions on plant risk. Specifically, on May 1 and again on May 2, 2009, the licensee removed the A Emergency Diesel from service for planned maintenance during severe weather conditions (i.e., Tornado Warning and Tornado Watch, respectively) without re-evaluating the potential adverse affect upon the existing on-line risk assessment. The severe weather conditions only lasted about an hour each day. This issue was entered into the licensee's corrective action program as problem evaluation report 171402.

The finding was determined to be greater than minor because the licensee's risk assessment failed to consider unusual external conditions that were present or imminent (e.g., severe weather, offsite power instability). According to Inspection Manual Chapter 0609, Appendix K, Maintenance Risk Assessment and Risk Management Significance Determination Process, the significance of this finding was determined to be of very low safety significance (Green) based on an initiating events frequency of  $<1.0E-7$ , and a very low risk deficit due to the number of redundant emergency diesels and the short duration of the severe weather. The cause of this finding was directly related to the crosscutting aspect of complete and accurate procedures in the area of human performance because the licensee's site-specific guidelines for assessing on-line risk did not require severe weather to be considered when determining plant risk nor did they require personnel to determine if severe weather is imminent prior to removing an emergency diesel generator from service (H.2.c). (Section 1R13).

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

**Significance:** G Mar 21, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**Inadequate Surveillance Procedure Causes Loss of Unit 1 RHR System Safety Function (Section 1R22)  
Inadequate Surveillance Procedure Causes Loss of Unit 1 RHR System Safety Function**

Green. A self-revealing non-cited violation of Technical Specification 5.4.1, "Procedures", was identified for an incorrect Unit 1 surveillance procedure that instructed technicians to install a jumper in the wrong location which resulted in the inadvertent lockout of the Loop II residual heat removal (RHR) pumps automatic start feature while the Loop I RHR pumps were removed from service for testing. The improperly installed jumper resulted in the RHR system being unable to perform its safety function. The immediate corrective actions for this event included removal of the jumper to restore the automatic start feature of the RHR Loop II pumps, revision to the surveillance procedure to reflect the correct location for the jumper, and completion of the surveillance. This finding was entered into the licensee's corrective action program as Problem Evaluation Report 166487.

The finding was determined to be more than minor because it was associated with the Mitigating Systems Cornerstone attribute of Procedure Quality and adversely affected the associated cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. A Phase 2 analysis was performed because the event represented a loss of the RHR system safety function. The Phase 2 analysis using Appendix A, Technical Basis for At-Power Significance Determination Process, of IMC 0609 determined that the finding was of very low safety significance (Green). The cause of this finding was directly related to the cross cutting area of Problem Identification and Resolution and the aspect of thorough evaluation of identified problems because a prior licensee-identified procedural discrepancy regarding the location of this jumper was not adequately evaluated and resolved to ensure the jumper would be installed in the correct circuit (P.1(c)).

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

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## Barrier Integrity

**Significance:** G Jul 17, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**Standby Gas Treatment Subsystem 'A' Inoperable Beyond the Technical Specification Allowed Outage Time (Section 40A2.a)**

• Green. A Green, self-revealing, non-cited violation (NCV) of Technical Specification (TS) limiting condition for operation (LCO) 3.6.4.3, "Standby Gas Treatment (SGT) System", was identified for the licensee's failure to comply with the LCO required actions for one inoperable SGT subsystem due to an inadequate investigation to ensure the system's operability, on November 30, 2008, following a loss of power to one of the three relative humidity heaters. This issue was entered into the corrective action program as Problem Evaluation Report 174597. The cause of the failure of the heater was a failed relay. The relay was replaced and the system was restored to service on June 20, 2009.

The finding is similar to example 2a in Inspection Manual Chapter (IMC) 0612, Appendix E, "Examples of Minor Issues," in that the example performance deficiency is not minor if Technical Specification limits were exceeded. In accordance with IMC 0612, Appendix B, "Issue Screening," the finding is greater than minor significance because it was associated with the Barrier Integrity cornerstone attribute of Human Performance and adversely affected the cornerstone objective of maintaining the radiological barrier functionality of Standby Gas Trains. Although the licensee ultimately was able to demonstrate that the SGT system could perform its safety function without the charcoal beds and associated heaters, compliance with SGT TS was a prerequisite to providing reasonable assurance that the SGT can protect the public from radionuclide releases caused by accidents or events. 10 CFR 50.36 defines TS limiting conditions for operation as the lowest functional capability or performance levels of equipment required for safe operation of the facility. The SGT TS LCO requirement was not met and therefore the cornerstone objective for functionality as described in the TSs, was not maintained.

In accordance with IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," the finding is determined to be of very low risk significance because the finding only represented a degradation of the radiological barrier function provided by the SGT system. Because this finding is of very low safety significance and has been entered in licensee's corrective action program, the violation is being treated as a non-cited violation. The cause of this finding was directly related to the cross-cutting aspect of thorough evaluation of identified problems in the problem identification and resolution area, because the licensee failed to properly classify, prioritize and evaluate the operability of the SGT system when the heater loss of power annunciator was received [P.1(c)]. (Section 40A2.a)

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

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## Emergency Preparedness

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## Occupational Radiation Safety

**Significance:**  Jun 30, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Failure to comply with the requirements of an RWP by entering a posted high radiation area**

A Green self-revealing non-cited violation (NCV) of TS 5.4.1, Procedures, was identified for a radiation worker who failed to follow the requirements of RWP 09270081 as required by procedure RCI 9.1, Radiation Work Permits, Rev. 57. The licensee has entered this issue into the Corrective Action Program as Problem Evaluation Report 171375.

This finding is greater than minor because it is associated with the Occupational Radiation Safety Cornerstone attribute of Program and Process (Exposure Control) and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. The finding was evaluated using the Occupational Radiation Safety SDP and determined to be of very low safety significance (Green) because it was not related to ALARA planning, nor did it involve an overexposure or substantial potential for overexposure, and the ability to assess dose was not compromised. The cause of this finding was directly related to the cross-cutting aspect of Work Practices in the area of Human Performance, because the radiation worker failed to use self-checking prior to passing through the swing gate into the posted high radiation area (H.4.a). (Section 20S1)

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

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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: SL-IV** Dec 31, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Report a Safety System Functional Failure Per 10 CFR 50.73**

A Severity Level IV non-cited violation (NCV) of 10 CFR 50.73(a)(2)(v)(D) and (vii)(D) was identified by the inspectors for the licensee's failure to recognize a safety system functional failure of the Unit 1 High Pressure Coolant Injection (HPCI) system and submit a licensee event report (LER) within 60 days. This issue was documented in the licensee's corrective action program as Problem Evaluation Reports 177206 and 204364, and subsequently reported as LER 050-259/2009-004.

This finding was considered as traditional enforcement because it had the potential for impacting the NRC's ability to perform its regulatory function. However, because this violation was of very low safety significance, was not repetitive or willful, and was entered into the licensee's corrective action program, the NRC has characterized this violation as a Severity Level IV NCV in accordance with Section IV.A.3 and Supplement I of the NRC Enforcement Policy. The cause of this finding was directly related to the cross-cutting aspect of timely corrective actions in the area of Problem Identification and Resolution because the licensee failed to address previously identified deficiencies regarding the documentation of safety system mission times in a timely manner [P.1(d)].

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

**Significance: N/A** Jul 17, 2009

Identified By: NRC

Item Type: FIN Finding

**Browns Ferry PI&R Summary**

The team concluded that, in general, problems were identified, evaluated, prioritized, and corrected. The licensee maintained a reasonable threshold for identifying problems as evidenced by the large number of Problem Evaluation Reports (PERs) entered annually into the CAP, management expectation that all personnel are encouraged to initiate a PER for deficiencies noted, and CAP procedures requiring all personnel initiate PERs to document Significant Conditions Adverse to Quality (SCAQs), Conditions Adverse to Quality (CAQs), and potential items for improvement. However, some deficiencies were identified by the inspection team which were not previously entered into the CAP. Generally, the licensee prioritized and evaluated issues, conducted adequate formal root cause evaluations for significant problems, and corrective actions specified for problems were acceptable. Overall, corrective actions developed and implemented for issues were generally effective. However, the team identified some examples where corrective actions were not fully effective.

The team determined that overall, audits and self-assessments were adequate in identifying deficiencies and areas for improvement in the CAP, and generally, appropriate corrective actions were developed to address these issues. However, the team noted that a significant number of deficiencies were identified through self assessments of the CAP, which was indicative of a program that, while improved, has yet to reach the licensee's own desired level of effectiveness. Specifically, a large number of PERs associated with corrective maintenance work orders were not written even though generation of such PERs was explicitly required by corrective action program procedures.

Based on discussions and interviews conducted with plant employees from various departments, the inspectors did not identify any reluctance by workers to report safety concerns, or utilize the corrective action program.

The team determined that corrective actions implemented, and planned to be implemented, to address the substantive cross-cutting issue in problem identification and resolution identified by the NRC in its annual assessment letter dated March 3, 2008, were appropriate. The team noted that some corrective actions to prevent recurrence associated with the substantive cross-cutting issue problem evaluation report (PER) were improperly implemented and ineffective. Specifically, the corrective action implemented to initiate PERs for all Corrective Maintenance Work Orders (CMWO) was ineffective in that several hundred CMWOs did not have PERs initiated.

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

Last modified : March 01, 2010