

## Browns Ferry 1 4Q/2016 Plant Inspection Findings

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### Initiating Events

**Significance:** G Sep 30, 2016

Identified By: Self-Revealing

Item Type: NCV Non-Cited Violation

#### **Failure to Maintain the High Pressure Fire Protection System Piping**

A self-revealing Non-cited Violation (NCV) of Technical Specification (TS) 5.4.1.d, Fire Protection Program Implementation, was identified for the licensee's failure to maintain the integrity of the high pressure fire protection piping. The licensee's immediate corrective action was to isolate the leak and entered this issue into their corrective action program as CR 1102016.

This performance deficiency was more than minor because it adversely affected the Initiating Events cornerstone objective of protection against external factors such as fire. Specifically, the high pressure fire protection system piping was unable to maintain the required pressure during a system demand. This finding was evaluated in accordance with NRC IMC 0609, Appendix F, Fire Protection Significance Determination Process, dated September 20, 2013. The inspectors determined the finding was Green because the finding did not affect the reactor's ability to reach and maintain the fuel in a safe and stable condition. The inspectors assigned a cross cutting aspect of Operating Experience because there was a similar occurrence of a fire protection piping break at Browns Ferry caused by heavy construction vehicle traffic in 2014 (P.5).

Inspection Report# : [2016003](#) (*pdf*)

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### Mitigating Systems

**Significance:** G Sep 30, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

#### **Inadequate Prompt Determination of Operability for HPCI Steam Line Inboard Isolation Valve**

An NRC identified NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action" was identified for the licensee's failure to promptly identify conditions adverse to quality associated with the prompt determination of operability (PDO) for CR 1061051. As an immediate corrective action, the licensee entered the violation into the licensee's corrective action program as CR 1193943. The performance deficiency was more-than-minor because it was associated with the Human Performance attribute of the Mitigating Systems cornerstone and adversely 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, had the deficiencies in the PDO been identified, engineers would have recognized that the resulting stresses exceeded allowable design stresses in the valve vendor's weak link analysis and approached the yield strength of the stem material. As a result, the practice was permitted to continue until the valve stem catastrophically failed. This finding was evaluated in accordance with NRC IMC 0609, Appendix A, Exhibit 2, Mitigating Systems Screening Questions, dated June 19, 2012. The inspectors determined the finding required a detailed risk evaluation because the finding represented a loss of system function and/or function for the high pressure coolant injection (HPCI) system. Senior Reactor Analyst performed a detailed risk evaluation using the Standardized Plant Analysis Risk (SPAR) model for Browns Ferry Unit 1. The HPCI system was modeled

as unavailable for a conservative exposure period of 7 days. The delta CDF estimate was less than 1E-6/yr range, which represents a finding of very low safety significance (Green). The dominant core damage sequence was an inadvertent open relief valve, failure of HPCI, and failure to depressurize. The availability of additional injection sources helped minimize the risk significance. The inspectors determined that the finding had a cross-cutting aspect in the Design Margins area of the Human Performance aspect (H.6), because engineers did not demonstrate the behavior of carefully guarding margins to ensure that safety related equipment was operated and maintained within design margins.

Inspection Report# : [2016003](#) (*pdf*)

**Significance:**  Aug 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Identify and Evaluate All Targets Within the Zone of Influence of Ignition Sources**

The NRC identified a violation of 10 CFR 50.48(c) for the licensee's failure to address in the Fire Probabilistic Risk Assessment (Fire PRA) the risk contribution associated with all potentially risk significant fire scenarios for a given fire compartment/fire area. The licensee did not identify and evaluate all targets that were within the zone of influence (ZOI) of ignition sources for selected fire scenarios that could potentially contribute to the risk for the fire scenarios. The licensee entered the issue in the corrective action program (CAP) as Condition Reports (CRs) 1195603 and 1197392. The affected area was already covered by an hourly roving fire watch as a compensatory measure.

The licensee's failure to address the risk contribution associated with all potentially risksignificant fire scenarios, as required by section 2.4.3.2 of NFPA 805, was a performance deficiency. For each example, the performance deficiency was determined to be more than minor because it was associated with the reactor safety mitigating systems cornerstone attribute of protection against external factors (i.e., fire) and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to analyze the full risk impact of the selected fire scenarios, and the missed targets in the ZOI for the selected fire scenarios had the potential to impact the ability to achieve safe and stable conditions. Using IMC 0609, Appendix F, Attachment 1, "Fire Protection Significance Determination Process Worksheet," the finding was screened as Green in step 1.6.1 "Screen by Licensee PRA-Based Safety Evaluation." There was no cross cutting aspect assigned to this finding because it was not indicative of current licensee performance since the original ignition source and target walkdowns were performed more than 3 years ago.

Inspection Report# : [2016011](#) (*pdf*)

**Significance:**  Aug 12, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Adequately Identify and Evaluate All Circuit Failures for NSCA Credited Equipment**

The NRC identified a violation of 10 CFR 50.48(c) for the licensee's failure to properly identify circuits required for the nuclear safety function. Specifically, the licensee's Nuclear Safety Capability Assessment (NSCA) failed to identify that fire-induced failure of cables associated with the undervoltage trip function of the 4KV Shutdown Board could cause the shutdown board to not shed loads upon an undervoltage condition. This could lead to overloading the emergency diesel generator (EDG) credited for powering the shutdown board. This item was entered into the CAP as CR 1199002. The affected area

was already covered by an hourly roving fire watch as a compensatory measure. Additionally, the licensee submitted EN 52150 to the NRC, documenting this as an unanalyzed condition.

The licensee's failure to identify circuits required for the nuclear safety function, as required by Section 2.4.2.2.1 of NFPA 805 was a PD. The PD was determined to be more than minor because it was associated with the reactor safety mitigating systems cornerstone attribute of protection against external factors (i.e., fire) and it adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee's failure to analyze the effects of fire damage on the 4kV shutdown bus undervoltage circuitry could result in overloading the emergency diesel generator (EDG) credited for powering the shutdown board. Using the guidance of IMC 0609, App. F, the finding was screened as Green because the risk increase associated with the finding was an increase of core damage frequency of  $<1E-6$ /year. There was no cross cutting aspect assigned to this finding because it was not indicative of current licensee performance since the original ignition source and target walkdowns were performed more than 3 years ago.

Inspection Report# : [2016011](#) (*pdf*)

**Significance:**  Apr 15, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

**Failure to Include Required Gasket Replacement in Limit Switch Surveillance Procedure**

An NRC-identified non-cited violation (NCV) of Title 10, Code of Federal Regulations (CFR) Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to include vendor requirements for maintaining the environmental qualification of the main steam isolation valve (MSIV) limit switches in maintenance procedures. Specifically, not maintaining the MSIV limit switches in their qualified condition impacts their reliability. The licensee entered this issue into the corrective action program as CR 1160702. The licensee evaluated the impact of the incorrect guidance, and determined that all three units were affected, and that the MSIV limit switches remained operable, although they were in an unqualified condition. The licensee plans to correct the affected procedures.

This performance deficiency was more than minor because it was associated with the mitigating systems cornerstone attribute of equipment performance and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

Specifically, not maintaining the MSIV limit switches in their qualified condition impacted their reliability. The team used IMC 0609, Att. 4, "Initial Characterization of Findings," issued June 19, 2012, for Mitigating Systems, and IMC 0609, App. A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012, and determined the finding to be of very low safety significance (Green) because the finding was a deficiency affecting the design of a mitigating structure, system, or component (SSC), and the SSC maintained its operability or functionality. The team determined that no cross-cutting aspect was applicable because the finding was not indicative of current licensee performance.

Inspection Report# : [2016010](#) (*pdf*)

**Significance:**  Feb 25, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Failure to Promptly Identify Conditions Adverse to Quality Associated with RHRSW Room Flood Barriers**

An NRC identified non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, was identified for the licensee's failure to promptly identify conditions adverse to quality associated with deficient flood barrier penetrations in the 'B' Residual Heat Removal Service Water (RHRSW) compartment. As an immediate corrective action, the licensee evaluated the deficiencies and determined that the equipment in the room would remain operable during a design basis flood. The violation was entered into the licensee's corrective action program as CR 1119892.

The performance deficiency was more-than-minor because it was associated with the protection against external factors attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Specifically, the capability of the flood protection function of the 'B' RHRSW compartment was adversely affected due to the presence of degraded penetrations. The finding was screened using IMC 0609 Appendix A, Exhibit 4, "External Events Screening Questions," dated June 19, 2012. The finding screened as very low safety significance (Green) because the finding would not cause a plant trip, initiating event, degrade two or more trains of a multi-train system or function, and it would not degrade one or more trains of a system that supports a risk significant system or function. Additionally, the finding did not involve the total loss of any safety function. The inspectors determined that the finding had a cross-cutting aspect in the Human Performance area of Conservative Bias (H.14) because personnel characterized the potential deficiencies as "not unacceptable" rather than establishing that final acceptability was still in question which required timely resolution.

Inspection Report# : [2016007](#) (*pdf*)

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## **Barrier Integrity**

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## **Emergency Preparedness**

**Significance:**  Mar 31, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Failure to adequately maintain emergency plan implementing procedures**

The inspectors identified a non-cited violation (NCV) of Title 10 of the Code of Federal Regulations (CFR), Part 50.54(q)(2), for the licensee's failure to maintain the effectiveness of its emergency plan by ensuring procedures for use by the emergency response organization are maintained and up-to-date as required by 10 CFR 50.47(b)(16). Corrective actions already taken were implementation of a revision (49) to EPIP-5, effective January 7, 2016, essentially replacing Section 3.6 and references to appropriate Appendices, and a broader scope EOC to review all site EPIPs to ensure no other inadvertent omissions were made.

The inspectors determined that the performance deficiency was more than minor because it was associated with the procedure quality attribute of the Emergency Preparedness (EP) cornerstone, adversely affected the associated cornerstone objective, and may have been used had an emergency been declared. The finding was evaluated using the EP significance determination process and was identified as having very low safety significance (Green) because it was a failure to comply with NRC requirements and was not a loss of the planning standard function. The finding was associated with a cross-cutting aspect in the Evaluation component of the Problem Identification and Resolution area

because the licensee failed to thoroughly evaluate a similar issue at one of its other sites to ensure extent of conditions commensurate with their safety significance are thoroughly resolved. [P.2]

Inspection Report# : [2016001](#) (pdf)

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## Occupational Radiation Safety

**Significance:**  Mar 31, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

### Unauthorized Entry into a High Radiation Area

A self-revealing, Non-cited Violation (NCV) of Technical Specification (TS) 5.7.1, was identified for a worker who entered a High Radiation Area (HRA) without proper authorization. Specifically, the worker entered a posted HRA located outside the Radwaste Ventilation Equipment Room without receiving a HRA briefing, and subsequently received a dose rate alarm. This issue was entered into the licensee's corrective action program as Condition Report (CR) 1072342, and the licensee took immediate corrective actions including surveys of the area, and restricting the worker's access to the Radiologically Controlled Area.

The performance deficiency was greater than minor because it was associated with the Occupational Radiation Safety cornerstone attribute of Program and Process (Monitoring and Radiation Protection (RP) Controls) and adversely affects 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 inspectors determined the finding to be of very low safety significance (Green) because it was not related to As Low As Reasonably Achievable (ALARA) planning, nor did it involve an overexposure or substantial potential for overexposure, and the ability to assess dose was not compromised. This finding involved the cross-cutting aspect of Human Performance, Procedural Adherence [H.8] because the event was a direct result of the worker's failure to adhere to requirements for HRA access.

Inspection Report# : [2016001](#) (pdf)

**Significance:**  Mar 31, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

### Unposted High Radiation Areas

A self-revealing, NCV of 10 CFR 20.1902(b), with two examples, was identified for the failure to post multiple HRAs. Specifically, areas within the Unit 2 (U2) Control Rod Drive Rebuild Room and U2 Reactor Water Cleanup Holding Pump Room contained dose rates exceeding 100 mrem/hr at 30 cm and remained unposted for several months during 2015. These issues were entered into the licensee's corrective action program as CR 1017294, CR 1023385, and CR 1119944, and the licensee took immediate corrective actions to correctly post the areas, performed surveys to evaluate the extent of condition, and performed an Apparent Cause Evaluation.

The performance deficiency was greater than minor because it was associated with the Occupational Radiation Safety cornerstone attribute of Program and Process (Monitoring and RP Controls) and adversely affects 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 inspectors determined the finding to be of very low safety significance (Green) because it was not related to As Low As Reasonably Achievable (ALARA) planning, nor

did it involve an overexposure or substantial potential for overexposure, and the ability to assess dose was not compromised. This finding involved the cross-cutting aspect of Human Performance, Documentation [H.7] because the unposted high radiation areas were a direct result of the failure to identify documented radiological conditions that required additional posting and control.

Inspection Report# : [2016001](#) (*pdf*)

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## Public Radiation Safety

**Significance:**  Mar 31, 2016

Identified By: NRC

Item Type: NCV Non-Cited Violation

### **Failure to Include the Correct Proper Shipping Name on Radioactive Material Shipping Papers**

The inspectors identified a NCV of 10 CFR 71.5 for the failure to include the correct Proper Shipping Name (PSN) on radioactive material shipping papers in accordance with the requirements of Department of Transportation (DOT) regulation 49 CFR 172.202. This resulted in multiple Low Specific Activity (LSA) shipments containing quantities exceeding an A2 value being shipped as “UN2915, Radioactive Material, Type A Package”. The licensee documented this issue in CR 1145617 and took immediate corrective actions including updating the software used to perform shipping activities and additional training of personnel.

The performance deficiency was greater than minor because it was associated with the Public Radiation Safety Cornerstone, Program & Process attribute (transportation program), and adversely affected the associated cornerstone objective to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian nuclear reactor operation. The inspectors determined the finding to be of very low safety significance (Green) because the issue involved transportation, but there were no radiation limits exceeded, and there was no package breach. In addition, it did not involve a Certificate of Compliance or low-level burial problem, nor was there a failure to make notifications or provide emergency response information. The finding has a cross-cutting aspect in the area of Human Performance, Training [H.9], because the DOT requirements pertaining to LSA shipments were not well understood.

Inspection Report# : [2016001](#) (*pdf*)

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## Security

Although the Security Cornerstone is included in the Reactor Oversight Process assessment program, the Commission has decided that specific information related to findings and performance indicators pertaining to the Security Cornerstone will not be publicly available to ensure that security information is not provided to a possible adversary. Other than the fact that a finding or performance indicator is Green or Greater-Than-Green, security related information will not be displayed on the public web page. Therefore, the [cover letters](#) to security inspection reports may be viewed.

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## Miscellaneous

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