

Browns Ferry 3

3Q/2011 Plant Inspection Findings

Initiating Events

Significance:  Sep 30, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Unit 3 loss of shutdown cooling during primary containment isolation system relay replacement

A self-revealing non-cited violation of Technical Specifications 5.4.1.a was identified for the licensee's failure to establish adequate work order instructions for maintenance activities on CR120A relays associated with the Unit 3 Primary Containment Isolation System (PCIS). Consequently, on May 12, 2011, while performing maintenance on a CR120A relay, electricians inadvertently initiated a PCIS Group 2 actuation which resulted in a loss of Unit 3 shutdown cooling (SDC). The licensee immediately restored the affected relay wiring and reestablished Unit 3 SDC. Additional, corrective actions to revise CR120A relay maintenance procedures were in progress. This issue was entered into the licensee's corrective action program as problem evaluation report (PER) 368764.

The finding was determined to be greater than minor because it was associated with the Initiating Events Cornerstone attribute of Procedure Quality, and adversely affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown. Specifically, the work package to replace the Unit 3 PCIS relays did not include specific work precautions or instructions to require that jumpers be installed to prevent an inadvertent Group 2 PCIS actuation. According to Inspection Manual Chapter (IMC) 0609, Significance Determination Process (SDP), Appendix G, Shutdown Operations, Table 1, Losses of Control, the finding was determined to be of very low safety significance because the change in temperature during the inadvertent loss of SDC did not exceed 20 percent of the temperature margin to boil. In addition, Checklist 8 of Appendix G, Attachment 1, Shutdown Operations, confirmed adequate mitigation capability remained available for all of the shutdown safety functions to be considered of very low safety significance. The cause of this finding was directly related to the cross-cutting aspect of complete documentation in the Resources component of the Human Performance area, because the licensee failed to provide adequate work package details concerning the replacement of PCIS relays which resulted in the loss of SDC [H.2.(c)]. (Section 40A3.6)

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

Significance:  Mar 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate corrective actions to address Unit 3 CR120A PCIS relays taht exceeded their recommended service life

An NRC identified non-cited violation of 10 CFR 50 Appendix B, Criteria XVI, Corrective Action, was identified for the licensee's failure to correct a condition adverse to quality related to Unit 3 primary containment isolation system (PCIS) logic relays exceeding their in-service life expectancy. Specifically, the licensee failed to replace numerous Unit 3 PCIS CR120A relays prior to exceeding their vendor's recommended service lifetime. The licensee has entered this issue into their corrective action program as problem evaluation report (PER) 348160.

This finding was determined to be more than minor because it was associated with the Equipment Performance attribute of the Initiating Events Cornerstone and affected the cornerstone objective to limit the frequency of those events that upset plant stability and challenge critical safety functions during power operations. Specifically, a relay failure could cause a reactor scram, engineered safeguards (ESF) actuation, and/or Group 1, 2, 3, or 6, primary containment isolation. The significance of the finding was evaluated using Phase 1 of the significance determination process in accordance with the Inspection Manual Chapter (IMC) 0609 Attachment 4, 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 Corrective Actions in the Corrective Action Program component of the Problem Identification and Resolution area, because the licensee failed to implement adequate corrective actions as part of PER 220336 to replace or extend the service life of the Unit 3 PCIS CR120A relays prior to exceeding their recommended service lifetime [P.1(d)]. (Section 4OA2.2)

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

Significance: G Mar 31, 2011

Identified By: NRC

Item Type: FIN Finding

Failure to identify adverse trend resulted in reactor scram

A self-revealing finding (FIN) was identified for the licensee's failure to adequately evaluate and take the required actions established by site standards to address an adverse system performance trend that had degraded below acceptable levels associated with the main generator exciter air coolers. Specifically, the licensee failed to identify that main generator exciter air cooler differential temperatures exceeded the licensee-defined limit of 10F, and did not initiate a PER as required by the licensee's procedural guidance, Nuclear Engineering Department Procedure (NEDP) -20, Conduct of the Engineering Organization, Section 3.1, System Performance Monitoring. Subsequent licensee corrective actions included installing vents on the exciter air coolers to minimize air binding, establishing a process and frequency for venting the exciter air coolers, and increasing engineering supervisory oversight of the system monitoring process. The licensee captured this issue in the corrective action program as PER 301505.

This finding is greater than minor because it is associated with the Human Performance attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of those events that upset plant stability. Specifically, the finding resulted in a Unit 3 manual reactor scram due to elevated main turbine bearing vibrations caused by excessive main generator exciter air cooler differential temperatures. The significance of the finding was evaluated using Phase 1 of the significance determination process in accordance with the Inspection Manual Chapter (IMC) 0609 Attachment 4, 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 Corrective Action Program Implementation in the Corrective Action Program component of the Problem Identification and Resolution area, because the licensee failed to identify the adverse trend of excessive differential temperatures between the exciter air coolers in a timely manner and enter it into the corrective action program. [P.1(a)]. (Section 4OA3.2)

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

Mitigating Systems

Significance: G Jun 30, 2011

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to take corrective actions to preclude a repetitive functional failure of an EDG due to excessive heat exchanger fouling

A self-revealing non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, was identified for the licensee's failure to take prompt corrective actions to preclude repetition of a significant condition adverse to quality (SCAQ) that resulted in the loss of a emergency diesel generator (EDG) safety function due to excessive heat exchanger fouling. On August 4, 2010 the licensee identified a SCAQ due to excessive fouling of the Unit 1/2 D EDG heat exchangers which resulted in a functional failure of the D EDG. Prompt corrective actions were not taken to preclude repetition because on June 5, 2011, excessive fouling was identified on the 3D EDG heat exchangers which resulted in a functional failure of the 3D EDG. Corrective actions taken by the licensee included cleaning and returning the 3D EDG heat exchangers to an operable status, and increasing monitoring of emergency equipment cooling water (EECW) cooling flow to all the EDG heat exchangers from weekly to every two days. The licensee entered this issue into their corrective action program as problem evaluation report (PER) 381569.

This finding was determined to be more than minor because it was associated with the Mitigating Systems Cornerstone attribute of Equipment Performance, and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the excessive fouling of the 3D EDG heat exchanger was a functional failure and resulted in unplanned unavailability of the 3D EDG. In accordance with Inspection Manual Chapter (IMC) 0609 Attachment 4, Phase I - Initial Screening and Characterization of Findings, this finding was determined to be of very low safety significance because it did not represent an actual loss of safety function of a single train for more than its technical specification allowed outage time of seven days, or screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The cause of this finding was directly related to the cross-cutting aspect of Maintaining Long Term Plant Safety (Equipment Issues) in the Resources component of the Human Performance area because of the licensee's failure to minimize the duration of a long-standing degraded equipment issue related to relic clam shells in the EECW system which resulted in a repetitive functional failure of an EDG due to excessive heat exchanger fouling. [H.2.(a)]. (Section 1R07)
Inspection Report# : [2011003](#) (pdf)

Barrier Integrity

Significance:  Mar 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate TS 5.5.2 program for primary coolant leaks outside containment

An NRC identified non-cited violation of Technical Specifications (TS) 5.5.2, Primary Coolant Sources Outside Containment was identified for the licensee's failure to establish, implement, and maintain an adequate program for minimizing primary coolant leaks from systems (i.e., Core Spray, Residual Heat Removal, High Pressure Coolant Injection, and Reactor Core Isolation Cooling) outside containment, that could contain highly radioactive fluids during a serious transient or accident, to levels as low as practicable. The licensee's corrective actions included identification, evaluation, and prioritization of all known primary coolant leaks outside containment; and development of a new program in accordance with 0-TI-578, Minimizing Primary Coolant Sources Outside Containment. This finding was entered into the licensee's corrective action program as problem evaluation report (PER) 317464.

This finding was determined to be more than minor because if left uncorrected it could have led to a more significant safety concern. Specifically, the licensee's failure to effectively minimize and monitor primary coolant leakage outside containment could have resulted in increased main control room exposure and/or offsite dose during an accident due to excessive radioactive fission product releases into secondary containment. The finding was determined to be of very low safety significance (Green) according to IMC 0609, Appendix H, Containment Integrity Significance Determination Process, Section 6.0, Type B Findings, because the primary coolant leak rate into secondary containment was a small fraction of the leakage assumed in the design basis accident (DBA) safety analyses. The cause of this finding was directly related to the cross-cutting aspect Complete and Accurate Procedures in the Resources component of the Human Performance area because the licensee's existing procedures were inadequate and incomplete for addressing the program requirements of TS 5.5.2 [H.2.(c)]. (Section 4OA2.5)

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

Emergency Preparedness

Significance: TBD Dec 31, 2010

Identified By: Self-Revealing

Item Type: VIO Violation

Repeated failure to provide complete and accurate information in LER 05000296/2009-003-02

The original LER 50-296/2009-003-00 dated May 24, 2010, and applicable PERs 200183,119628 and 246527, including cause determination and corrective action plans, were reviewed by the inspectors and documented in

Section 40A3.2 of NRC inspection report (IR) 05000296/2010003. As a result of this prior review, two violations of NRC requirements were identified: NCV 05000296/2010003-02, Unit 3 RCIC System Inoperable beyond the Technical Specifications Allowed Outage Time; and NCV 05000296/2010003-03, Failure to Provide Complete and Accurate Information in LER 0500296/2009-003-00. The NCV 05000296/2010003-03 was the result of the review of the original LER, when the inspectors determined that, contrary to 10 CFR 50.9, LER 0500296/2009-003-00 was not accurate or complete in all material aspects for which the licensee initiated PER 246527. Specifically, the LER inaccurately reported the duration of system inoperability, inaccurately reported the availability of HPCI while the RCIC was inoperable, and did not report a previous event that occurred on the same unit with the same cause as required by 10 CFR 50.73(b)(5).

As part of the PER 246527 corrective actions, the licensee issued a revised LER 0500296/2009-003-01 on July 15, 2010. The principal intent of this LER revision was to establish the date that began the period of RCIC inoperability as March 22, 2006, and to notify the NRC that additional time was needed to complete a determination of any concurrent HPCI system inoperability. The licensee revised their commitment to supplement the LER to September 30, 2010. Subsequently, the licensee issued their second revised LER 0500296/2009-003-02 on August 31, 2010. This LER was revised by the licensee to correct and update the LER narrative with an expanded timeline and results from their efforts to retrieve high speed computer data regarding actual RCIC pump performance. This second revision was also intended to address and correct any missing or inaccurate information identified by the inspectors in the original LER. This revised LER included changes to the Abstract, Description of Event, Cause of the Event, Analysis of the Event, and Corrective Actions.

The second revision of the LER did specifically report a more accurate duration of system inoperability, including when the nonconforming turbine electric governor-remote (EG-R) had been installed; a discussion of concurrent HPCI unavailability while RCIC was inoperable; and a discussion of the previous event on February 9, 2007 that occurred on the same unit with the same cause. The inspectors reviewed the revisions 1 and 2 of the LERs, and verified the root causes and previously identified corrective actions for the RCIC flow instabilities were not substantially different, except for the additional clarifying information provided.

Inspection Report# : [2010005](#) (*pdf*)

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

Occupational Radiation Safety

Public Radiation Safety

Physical Protection

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

Miscellaneous

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