

Browns Ferry 3

2Q/2011 Plant Inspection Findings

Initiating Events

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:  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 40A3.2)

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

Significance:  Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to adequately test molded case circuit breakers

The inspectors identified a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," for failure to establish a preventive maintenance (PM) test program for safety-related molded case circuit breakers (MCCBs) to demonstrate these breakers would perform satisfactorily upon demand. Since initial startup of all three units, the inspectors found that the licensee had not included 612 critical MCCBs, many of them safety-related, in their PM program which resulted in the MCCBs receiving no planned maintenance or testing. The licensee entered this issue into the corrective action program as problem evaluation report (PER) 209095. The licensee's corrective actions included: identifying all critical MCCBs that required preventive maintenance, developing test procedures for these MCCBs, performing testing for all affected MCCBs, and conducting an extent-of-condition review of all safety-related components potentially excluded from the PM program.

This finding was determined to be of greater than minor significance because it was associated with the Protection Against External Factors attribute of the Initiating Events Cornerstone and adversely affected the cornerstone objective to limit the likelihood of those events, such as fire, that challenge critical safety functions during shutdown as well as power operations. Specifically, the lack of a PM program for safety-related MCCBs resulted in no periodic planned maintenance or testing being performed since original installation, which in most cases was over thirty years. Based on operating experience, this could result in a breaker being slow to trip or sticking in the "on" position after an over-current condition. In accordance with IMC 0609, Significance Determination Process (SDP), Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," this finding was determined to require a Phase 3 analysis since the finding represented an increase in the likelihood of a fire caused by an electrical fault at the MCCB compartment with the breaker not opening. A regional Senior Reactor Analyst conducted a Phase 3 SDP analysis, which concluded that the finding was of very low safety significance (Green).

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 did not adequately implement corrective actions to resolve the deficiencies previously identified by PER 131875 regarding certain Westinghouse MCCBs that were not in the PM program [P.1(d)]. (Section 40A5.4)

Inspection Report# : [2010004](#) (pdf)

Significance:  Sep 24, 2010

Identified By: NRC

Item Type: FIN Finding

Failure to Implement the Provisions of Preventative Maintenance (PM) Program Which Contributed to a Manual Reactor Scram

Green: The inspectors identified a finding for the licensee's failure to implement the applicable provisions of the Tennessee Valley Authority (TVA) Preventative Maintenance (PM) Program to replace the coil in the solenoid valve controlling the opening of the Unit 3 Condensate Demineralizer bypass valve on the specified PM frequency. Failure of this coil was identified as a contributing cause in Root Cause Analysis for PER 200203, "Unit 3 Manual Scram Due to Lowering Reactor Water Level." This finding was entered into the licensee's corrective action program as PER 245390.

The inspectors determined that the licensee's failure to implement the TVA PM program was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Initiating Events 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, since failure to implement the provisions of the PM program increased the likelihood of a component failure which contributed to a plant transient. Specifically the failure of the solenoid coil contributed to a reactor trip. The inspectors determined that the finding was of very low safety significance 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 inspectors determined that this finding directly involved the cross-cutting area of Human Performance, component of Work Practices and aspect of Procedural Compliance because licensee personnel failed to follow the guidance contained in the Preventive Maintenance program resulting in a plant transient. [H.4.b] (Section 40A2.a.3.2)
Inspection Report# : [2010006](#) (pdf)

Mitigating Systems

Significance:  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)

Significance:  Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to perform functional evaluations for gas identified during venting

An NRC-identified Green non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified for the licensee's failure to perform functional evaluations in accordance with procedure NEDP-22, Functional Evaluations, when gas was identified in the High Pressure Coolant Injection (HPCI) System during the Technical Specification required surveillance. The licensee has subsequently performed functional evaluations of the occurrences and entered the issue into their corrective action program as problem evaluation report (PER) 223067.

This finding was considered more than minor because it adversely affected the Mitigating Systems Cornerstone objective of ensuring the availability and reliability of safety systems, and is related to the attribute of Procedure Quality (i.e.- Maintenance and Testing Procedures). Specifically, the failure to perform a functional evaluation or provide adequate justification for not performing one upon identification of gas during venting of the system could affect the operability, availability, and reliability of the HPCI system or could result in missing an opportunity to identify the source of voiding to preclude future inoperability. This deficiency also paralleled Inspection Manual Chapter 0612, Appendix E, Example 4.a, as the licensee routinely did not perform the required functional evaluations. The team assessed this finding using Inspection Manual Chapter 0609, Significance Determination Process, and determined that the finding was of very low safety significance (Green) because subsequent functional evaluations showed that the gas voids did not impact the operability of the HPCI system.

The cause of this finding was directly related to the cross cutting aspect of Evaluation of Identified Problems in the Corrective Action Program component of the Problem Identification and Resolution area, in that the licensee failed to thoroughly evaluate gas voids such that the resolution addressed causes and extent of conditions, as necessary, and included the failure to thoroughly evaluate for operability and reportability conditions adverse to quality. [P.1(c)] (Section 40A5)

Inspection Report# : [2010004](#) (*pdf*)

Significance:  Sep 24, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Maintenance Procedure for Siemens Horizontal Vacuum Circuit Breakers Circuit Breakers (Section 40A2.a.3.6)

Green: The inspectors identified a non-cited violation of Technical Specification (TS) 5.4.1 for the licensee's failure to have adequate preventative maintenance procedures for Siemens Horizontal Vacuum Circuit Breakers. Plant procedure EPI-0-000-BKR015, 4KV Wyle/Siemens Horizontal Vacuum Circuit Breaker (Type-3AF) and Compartment Maintenance, Revision 28, did not provide specific guidance for checking the tightness of the closing spring charging motor mounting bolts. As a result, on June 15, 2010 while the 3C RHR pump was in service for suppression pool cooling, the charging motor in the pump breaker cubicle became detached from its mount. The charging spring failed to recharge and the pump would not have restarted if needed following a trip of the circuit breaker. The licensee reattached the charging motor and restored the 3C RHR pump to service. The licensee also revised procedure EPI-0-000-BKR015 to include instructions for ensuring the charging motor was securely fastened to the circuit breaker. This finding was entered into the licensee's corrective action program as PER 234443.

The inspectors determined that the failure to have an adequate maintenance procedure for circuit breaker maintenance was a performance deficiency. This performance deficiency was more than minor because it was associated with the Mitigating Systems Cornerstone attribute of Procedure Quality and adversely affected the cornerstone objective in that the PM procedure for the breaker did not assure the 3C RHR pump could perform its intended safety functions. The inspectors determined that the finding was of very low safety significance because it did not result in inoperability of a safety function for greater than the allowed technical specification outage time and was not potentially risk-significant due to external events. The inspectors determined that this finding directly involved the crosscutting area of Human Performance, component of Resources and aspect of Complete Documentation because the licensee did not maintain adequate plant procedures for equipment maintenance. Specifically, procedure EPI-0-000-BKR015, Revision 28 did not contain guidance for checking the charging motor bolt tightness resulting in the 3C RHR pump charging motor becoming detached and adversely affecting train operability. [H.2(c)] (Section 40A2.a.3.6)

Inspection Report# : [2010006](#) (*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 4OA3.2 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*)

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

Last modified : October 14, 2011