Browns Ferry 2
2Q/2011 Plant Inspection Findings

Initiating Events

Significance: G Mar 31, 2011
Identified By: Self-Revealing
Item Type: NCV NonCited Violation
Loss of reactor water level during Unit 2 reactor reassembly due to a mispositioned valve
A self-revealing non-cited violation of Technical Specifications (TS) 5.4.1.a was identified for the licensee's failure to adequately implement operations instruction 2-OI-74, Residual Heat Removal System, to ensure the reactor cavity draindown flow path was isolated prior to suppression pool draindown. On March 25, 2011, Operations personnel inadvertently left a Residual Heat Removal (RHR) system drain valve in the open position which led to an uncontrolled draindown of the reactor pressure vessel (RPV) coolant to the suppression pool. Operators immediately identified the RPV level decrease and restored the valve lineup and water level. The licensee's immediate corrective actions re-emphasized adherence to log keeping and turnover requirements; instituted shift manager challenges on activities that impact key safety functions including assessments of procedures, plant configuration, turnover information, and pre-job briefs of personnel roles and responsibilities; and, for those same activities, instituted peer checks, marked up drawings, and supervisory review of completed field copies of procedures. This issue was entered into the licensee's corrective action program as problem evaluation report (PER) 344533.

This finding was considered more than minor because it was 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 and challenge critical safety functions during shutdown. Specifically, a mispositioned RHR drain valve resulted in a loss of control of the RPV water level. This finding was determined to be of very low safety significance (Green) according to Inspection Manual Chapter (IMC) 0609, Appendix G, Shutdown Operations, because the inadvertent loss in excess of 2 feet (approximately 40 inches) of reactor coolant inventory represented a loss of inventory control. Using IMC 0609, Appendix G, Attachment 3, "Phase 2 Significance Determination Process Template for BWR During Shutdown," a Senior Reactor Analyst performed an analysis and determined the loss of inventory event was
of very low risk significance (Green) due in part to automatic functions being available to isolate and mitigate the leak had it continued and remained undetected/uncorrected by the operators. The cause of this finding was directly related to the cross-cutting aspect of Work Activity Coordination in the Work Control component of the Human Performance area, because inadequate documentation and communication of plant system configuration by the control room operators resulted in a mispositioned valve and loss of RPV water level [H.3.(b)]. (Section 1R20.1)
Inspection Report# : 2011002 *(pdf)*

Significance: G 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 4OA5.4)

Inspection Report# : 2010004 *(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)*

Significance: G Sep 30, 2010
Identified By: NRC
Item Type: NCV NonCited Violation

Failure to adequately assess online risk associated with maintenance activities on risk significant SSCs
The inspectors identified a non-cited violation of 10 CFR Part 50.65 (a)(4), for inadequate risk assessments of on-line risk associated with ongoing maintenance activities. Specifically, on July 21 and then again on September 16, 2010, the inspectors found that the licensee failed to perform a probabilistic risk analysis (PRA) evaluation of the multiple risk significant equipment that had been taken out of service for planned on-line maintenance. The licensee entered this issue into the corrective action program as problem evaluation reports (PERs) 241885 and 254000. In both instances the licensee subsequently performed the required PRA evaluations which determined the on-line risk to be Green.

This finding affected the Mitigating Systems cornerstone and was determined to be greater than minor according to Inspection Manual Chapter (IMC) 0612, Appendix B, Issue Screening, because minor violations of 10 CFR 50.65(a)(4) have occurred repeatedly on five occasions and if continued to be left uncorrected would have the potential to lead to a more significant safety concern. The significance of this finding was evaluated using IMC 0609, Appendix K, Maintenance Risk Assessment and Risk Management Significance Determination Process. Based on Appendix K, the inspectors determined that this finding was of very low safety significance (Green) because the licensee's PRA evaluation concluded the actual risk deficit was less than 1E-6 for the incremental core damage probability deficit (ICDPD) and less than 1E-7 for the incremental large early release probability deficit (ILERPD). The cause of this finding was directly related to the cross cutting aspect of Procedural Compliance in the Work Practices component of the Human Performance area, because the licensee failed to follow the instructions in 0-TI-367 which required a PRA evaluation to be performed in accordance with SPP-9.1 [H.4(b)]. (Section 1R13)

Inspection Report# : 2010004 *(pdf)*

Significance: G 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 4OA5)

Inspection Report# : 2010004 *(pdf)*

Significance: G Sep 24, 2010
Identified By: NRC

Item Type: NCV NonCited Violation
Failure To Correct The EECW Valves Throttled Below Analyzed Condition
Green: The inspectors identified a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, for the licensee's failure to adequately evaluate and take prompt corrective actions to address a condition adverse to quality related to two Emergency Equipment Cooling Water (EECW) system flow control valves determined to have been throttled below the analyzed 0.125 inch gap for a period of approximately three months. This condition restricted the flow to the cooler due to flow blockage which could have resulted in inoperability of the downstream safety-related Core Spray (CS) pump room heat exchangers. This finding was entered into the licensee's corrective action program as PER 257029.
The inspectors determined that the licensee's failure to promptly address an identified deficiency associated with safety related equipment was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affects the cornerstone objective to ensure the availability, reliability, and capability of the Core Spray system to respond to initiating events to prevent undesirable consequences; (i.e., core damage) , since it resulted in 2 valves in the core spray system remaining throttled below their analyzed seat to disc clearance for several months after the licensee became aware of this condition, thus subjecting these valves to an increased likelihood of clogging with debris and affecting the reliability of the system.
The inspectors determined that the finding was of very low safety significance because the finding was not a design deficiency, did not result in an actual loss of system or single train function, and was not potentially risk significant due to external events. The inspectors determined that this finding directly involved the cross-cutting area of Problem Identification and Resolution, component of the Corrective Action Program and aspect of Through Evaluation of Identified Problems because the licensee did not perform a thorough evaluation of identified problems such that the resolutions address causes and extent of conditions. [P.1(c)] (Section 4OA2.a.3.1)
Inspection Report# : 2010006 *(pdf)*

Significance: G Sep 24, 2010
Identified By: NRC
Item Type: NCV NonCited Violation
Failure to Correct a Condition Adverse to Quality Associated with the 2D Residual Heat Removal (RHR) Room Cooler (Section 40A2.a.3.3)
Green: The inspectors identified a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, for the licensee's failure to correct a condition adverse to quality by failing to implement adequate corrective actions to address degradation in the performance of the 2D RHR room cooler. On July 17, 2009, the 2D RHR room cooler thermal overload failed due to high mechanical vibrations, which the licensee failed to identify and correct prior to a subsequent failure on August 19, 2009. This finding was entered into the licensee's corrective action program as PER 261728.

The inspectors determined that the licensee's failure to implement adequate corrective actions after the 2D RHR motor trip on July 17, 2009 was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone in that it adversely affected the reliability of the 2D RHR room cooler to respond to initiating events. 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. The inspectors determined that this finding directly involved the cross-cutting area of Problem Identification and Resolution, component of the Corrective Action Program and aspect of Appropriate and Timely Corrective Actions because the licensee did not implement appropriate and timely corrective actions to resolve a condition adverse to quality. Specifically, the problem with the 2D RHR room cooler was not adequately addressed after the motor trip on July 17, 2009. [P.1 (d)] (Section 4OA2.a.3.3)
Inspection Report# : 2010006 *(pdf)*

Significance: G Sep 24, 2010
Identified By: NRC
Item Type: NCV NonCited Violation
Failure to maintain an Adequate Surveillance Procedure to Prevent an Unplanned HPCI Isolation (Section 40A2.a.3.5)
Green: The inspectors identified a self-revealing non-cited violation of Technical Specifications 5.4.1.a, Procedures, for an inadequate surveillance procedure used to test High Pressure Coolant Injection (HPCI) pressure switches that led to an unplanned HPCI system isolation and HPCI system being declared inoperable. This finding was entered into the licensee's corrective action program as PER 239313.

The inspectors determined the failure to establish an adequate procedure used for connecting and disconnecting VOMs during testing of pressure switches on the HPCI system was a performance deficiency. The performance deficiency was more than minor because it affected the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective in that the licensee did not ensure reliability and availability of the HPCI system to respond to initiating events to prevent undesirable consequences. The inspectors determined the finding was of very low safety significance because HPCI was out of service for a total of about 12 hours and did not exceed its TS allowed outage time per TS 3.5.1.c. The inspectors determined that this finding directly involved the cross-cutting area of Human Performance, component of Resources and aspect of Complete Documentation because the licensee failed to provide
an adequate procedure to perform the HPCI surveillance test. [H.2(c)] (Section 4OA2.a.3.5)
Inspection Report# : 2010006 *(pdf)*

Barrier Integrity

Significance: G 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

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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