



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8931

August 21, 2009

Mr. Preston D. Swafford
Chief Nuclear Officer and Executive Vice President
Tennessee Valley Authority
3R Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC PROBLEM IDENTIFICATION AND
RESOLUTION INSPECTION REPORT 05000259/2009006, 05000260/2009006
AND 05000296/2009006

Dear Mr. Swafford:

On July 17, 2009, the U. S. Nuclear Regulatory Commission (NRC) completed a team inspection at your Browns Ferry Nuclear Plant, Units 1, 2 and 3. The enclosed inspection report documents the inspection findings, which were discussed on July 17, 2009 with Mr. R. West and Mr. S. Bono, respectively and other members of your staff.

The inspection was an examination of activities conducted under your licenses as they relate to the identification and resolution of problems, and compliance with the Commission's rules and regulations and with the conditions of your operating licenses. Within these areas, the inspection involved examination of selected procedures and representative records, observations of plant equipment and activities, and interviews with personnel.

On the basis of the samples selected for review, the team concluded that in general, your corrective action program processes and procedures were adequate; thresholds for identifying issues were appropriate; and problems were generally evaluated and corrected within the problem identification and resolution program (PI&R). Additionally, the team determined your corrective actions implemented to address the substantive cross-cutting issue (SCCI) in the area of problem identification and resolution were appropriate. However, the team noted several instances where corrective actions associated with the SCCI were not fully effective.

This report documents one self-revealing finding of very low safety significance (Green) which was determined to involve a violation of NRC requirements. Additionally, one licensee-identified violation, which was determined to be of very low safety significance is listed in this report. However, because of the very low safety significance and because it was entered into your corrective action program, the NRC is treating the finding as a non-cited violation (NCV) consistent with Section VI.A.1 of the NRC's Enforcement Policy. If you contest any NCV in this report you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk Washington DC 20555-0001; with copies to the Regional Administrator Region II; the Director,

Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington D.C. 20555-0001;
and the NRC Resident Inspector at the Browns Ferry Nuclear Plant.

In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at Watts Bar Unit 1. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web-site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Daniel Merzke, Acting Chief
Reactor Projects Branch 7
Division of Reactor Projects

Docket Nos.: 50-259, 50-260, 50-296
License Nos.: DPR-33, DPR-52, DPR-68

Enclosure: Inspection Report 05000259/2009006, 05000260/2009006, and
05000296/2009006
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington D.C. 20555-0001; and the NRC Resident Inspector at the Browns Ferry Nuclear Plant.

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Letter to Preston D. Swafford from Daniel Merzke dated August 21, 2009

SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC PROBLEM IDENTIFICATION AND
RESOLUTION INSPECTION REPORT 05000259/2009006, 05000260/2009006
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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 05000259, 05000260, 05000296

License Nos.: DPR-33, DPR-52, DPR-68

Report No.: 05000259/2009006, 05000260/2009006 and 05000296/2009006

Licensee: Tennessee Valley Authority (TVA)

Facility: Browns Ferry Nuclear Plant, Units 1, 2, and 3

Location: Corner of Shaw and Nuclear Plant Roads
Athens, AL 35611

Dates: June 29 – July 3, 2009
July 13 – 17, 2009

Inspectors: R. Taylor, Senior Project Inspector, Team Leader
J. Rivera-Ortiz, Senior Project Inspector
P. Higgins, Project Engineer
K. Korth, Resident Inspector, Browns Ferry
C. Osterholtz, Senior Operations Engineer

Approved by: Daniel Merzke, Acting Chief
Reactor Projects Branch 7
Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000259/2009006, 05000260/2009006 and 05000296/2009006; 5/29/2009 – 6/17/2009; Browns Ferry Nuclear Plant, Units 1, 2 and 3; biennial inspection of the identification and resolution of problems.

The inspection was conducted by two senior project inspectors, a project engineer, a resident inspector, and a senior operations inspector. One Green finding of very low safety significance was identified during this inspection and was classified as a non-cited violation (NCV). The significance of most findings is indicated by their color (i.e., Green, White, Yellow, or Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). The cross-cutting aspect was determined using IMC 0305, Operating Reactor Assessment Program. Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

Identification and Resolution of Problems

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.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Barrier Integrity

- 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 4OA2.a)

B. Licensee-Identified Violations

One violation of very low safety significance was identified by the licensee and has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violation is discussed in Section 4OA7 of this report.

REPORT DETAILS

.4 OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution

The team based the following conclusions, in part, on issues identified during the period of October 1, 2008 through July 17, 2009. In addition, the team reviewed age-dependent issues for selected systems identified in the past five years.

a. Assessment of the Corrective Action Program (CAP)

(1) Inspection Scope

The inspectors reviewed the licensee's CAP procedures which described the administrative process for initiating and resolving problems primarily through the use of problem evaluation reports (PERs). The inspectors reviewed selected PERs, verified corrective actions were implemented, and attended meetings where PERs were screened for significance to determine whether the licensee was identifying, accurately characterizing, and entering problems into the CAP at an appropriate threshold.

The inspectors selected PERs for review which involved issues covering the seven cornerstones of safety identified in the NRC's Reactor Oversight Process (ROP). The selected samples involved various licensee classified severity levels and site departments. These PERs were reviewed to assess each department's threshold for identifying and documenting plant problems, thoroughness of evaluations, and adequacy of corrective actions. The inspectors also conducted a detailed review of PERs for risk significant systems which were selected based on risk insights from the licensee's probabilistic safety assessment and discussions with the Senior Resident Inspector. The systems selected for review included the Emergency Diesel Generators (EDG), Reactor Core Isolation Cooling (RCIC) system, and 250 VDC system. The inspectors reviewed PERs, maintenance history, completed work orders (WOs) for the systems, and reviewed associated system health reports. These reviews were performed to verify that problems were being properly identified, appropriately characterized, and entered into the CAP. Items reviewed generally covered a 9 month period of time; however, in accordance with the inspection procedure, a five-year review was performed for selected systems for age-dependent issues.

The inspectors conducted plant walkdowns of equipment associated with the selected systems to assess the material condition and to look for any deficiencies that had not been entered into the CAP. Control Room walkdowns were also performed to assess the main control room (MCR) deficiency list and to ascertain if deficiencies were entered into the CAP. Operator Workarounds and Operator Burdens screenings were reviewed and the inspectors verified compensatory measures for deficient equipment were being implemented in the field. The inspectors reviewed PERs, including root and apparent cause evaluations, site and department trend reports, and observed other activities, and verified that the licensee appropriately prioritized and evaluated problems in accordance with their risk significance. The review was to verify that the licensee determined the cause of the problems, including root cause analysis where required, and addressed operability, reportability, common cause, generic concerns, and extent of condition.

The review included the appropriateness of the assigned significance, the timeliness of resolutions, the level of effort in the investigation, and the scope and depth of the causal analysis. The review also assessed if the licensee had appropriately identified and prioritized corrective actions to prevent recurrence.

The inspectors reviewed 95 PERs encompassing all priorities, and 19 work orders initiated to resolve PERs to verify the licensee had identified and implemented timely and appropriate corrective actions to address problems. The inspectors verified that the corrective actions were properly assigned, documented, and tracked to ensure completion. The review was also conducted to verify the adequacy of corrective actions to address equipment deficiencies and maintenance rule (MR) functional failures of risk significant plant safety systems.

The inspectors attended various plant meetings to observe management oversight functions of the corrective action process. These included PER Screening Committee (PSC) meetings and Corrective Action Review Board (CARB) meetings.

Furthermore, the inspectors verified that issues identified by licensee audits and self-assessments were entered into and dispositioned by the CAP, as appropriate. The team also reviewed corrective action packages related to previously issued non-cited violations and licensee event reports.

Documents reviewed are listed in the Attachment.

(2) Assessment

Identification of Issues

The team determined that the licensee was generally effective in identifying problems and entering them into the CAP. There was a low threshold for entering issues into the CAP and employees were encouraged to initiate PERs for any reason. Trending was generally effective in monitoring equipment performance. Site management was actively involved in the CAP and focused appropriate attention on significant plant issues.

Based on reviews and walkdowns of accessible portions of the selected systems, the inspectors determined that system deficiencies were being identified and placed in the licensee's CAP. However, during the walkdown of the RCIC system, the inspectors identified some issues that had not been previously entered into the CAP. They included: steam leak on RCIC system (PER 176402 initiated); RCIC gland seal vacuum tank pressure high alarm actuates when RCIC is operated and will not clear (PER 176348 initiated). The failure to initiate PERs for all conditions adverse to quality was determined to be a performance deficiency which was assessed using IMC 0612 Appendix B and was screened as Minor because no safety consequences to the plant occurred as a result of the performance deficiency. The licensee's failure to comply with the requirement to initiate PERs for all conditions adverse to quality constituted a violation of minor significance that was not subject to enforcement action in accordance with the NRC's Enforcement Policy.

Prioritization and Evaluation of Issues

Based on the review of audits conducted by the licensee and the assessment conducted by the inspection team during the onsite period, the team concluded that problems were generally prioritized and evaluated in accordance with the licensee's CAP procedures as described in the condition classification guidance in PIDP-4, "Corrective Action Program Screening and Oversight," Appendix A. Each PER written was assigned a priority level at the PSC meeting, which was chaired by the Performance Improvement Manager. Management reviews of PERs conducted by the CARB were thorough, and adequate consideration was given to system or component operability and associated plant risks. However, the team had several observations related to the evaluation of issues:

- During the 250V DC system walkdown inspectors noted a visible leak at the 250V DC safety related batteries. The leak was visible between batteries 89 & 90. In reviewing the PERs and functional evaluation associated with the leak, the inspectors determined that not all aspects of the battery operability were covered in the evaluation. Specifically, the defect in the battery casing which allowed fluid to leak from the battery was not characterized and no evaluation of the behavior of this defect during a seismic event was considered in the evaluation. The licensee initiated PER 176517 to address this issue. The inadequate functional evaluation was determined to be a performance deficiency and was assessed using IMC 0612 Appendix B. The issue screened as Minor because the small amount of observed leakage did not challenge the operability of the batteries, and no safety consequences to the plant had occurred as a result of the performance deficiency.
- Inspectors reviewed PER 156416, which was initiated to address an unsatisfactory relay functional check on 4 kV Shutdown Board 'C.' The most probable cause of the unsatisfactory relay functional check was faulty contacts in the relay. The apparent cause "grading sheet" for this issue identified that the apparent cause was not clearly stated and no actions were initiated to address the extent of condition. Initially inspectors did not recognize actions were taken to incorporate the "grading sheet" comments into the cause analysis and corrective action plans. However, after discussion it was recognized that the corrective action plan was updated with unclear actions. PER 176462 was initiated to clarify corrective actions associated with the extent of condition review.
- Inspectors reviewed PER 162127, which was initiated to address the failure of local board voltage and frequency indicators on 'C' EDG. The cause of this failure was determined to be the absence of a fuse, which was removed and not reinstalled during previous testing activities. The initial operability evaluation determined that the lack of local voltage and frequency indication was not an operability concern because indication of these parameters was available in the main control room. However, the resident inspectors identified that the operability evaluation did not consider certain Appendix R scenarios where local indication may be required. As a result of the inspectors' observation, a Functional Evaluation was performed and it determined that the EDG was still operable to mitigate the required Appendix R scenario. The team determined that the failure of the licensee to perform an adequate evaluation was minor because it did not impact the availability and reliability of the EDG.

Effectiveness of Corrective Actions

Based on a review of corrective action documents, interviews with licensee staff, and verification of completed corrective actions, the team determined that the licensee has made progress related to the area of corrective action effectiveness. Overall, corrective actions were adequate in correcting plant problems in that conditions adverse to quality were promptly identified and corrected, and that generally, corrective actions implemented by the licensee were appropriate for the risk significance of the problem identified. The team noted that the licensee performed corrective actions to prevent recurrence for all significant conditions adverse to quality as well as select conditions adverse to quality, as defined by licensee procedure SPP-3.1, "Corrective Action Program." For significant conditions adverse to quality, the corrective actions directly addressed the cause and in most cases effectively prevented recurrence in that a review of performance indicators, all PERs, and effectiveness reviews demonstrated that the significant conditions adverse to quality had not recurred. However, some corrective actions to prevent recurrence associated with conditions adverse to quality were improperly implemented and ineffective. The team made the following observations:

- Turn Around Plan PER 148690 contained a corrective action that all plant issues lists must contain PERS for referenced issues (Generic Letter 91-18, operational concerns, engineering concerns, troubled annunciators, etc). During the October 2008 PI&R, the team identified that the troubled annunciators list did not reference PERs. The licensee generated PER 153900 to address the deficiency identified by the inspectors. However, in June 2009, the licensee identified the same deficiency in which PERs were still not referenced for items on the troubled annunciators list. PER 175122 was written to address this recurring deficiency. The failure to ensure that corrective actions are performed as specified in accordance with SPP-3.1, "Corrective Action Program," constituted a violation of minor significance that was not subject to enforcement action in accordance with NRC's Enforcement Policy.
- PER 166283, written as a result of self assessment BFN-SIT-S-09-006, identified that PERs were not being initiated for corrective maintenance work orders as required by SPP 6.1, "Work Order Process Initiation," which specifies that PERs should be generated for all corrective maintenance work orders. PER 166283 contained no actions taken to address this specific deficiency. The failure to ensure that corrective actions are performed as specified in accordance with SPP-3.1, "Corrective Action Program," constituted a violation of minor significance that was not subject to enforcement action in accordance with NRC's Enforcement Policy. The licensee identified the same recurring deficiency in a subsequent self assessment discussed in section 4OA2.b.

(3) Findings

Introduction: 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 an inoperable SGT subsystem.

Description: Each subsystem of SGT contains three heaters designed to maintain relative humidity to less than 70% to ensure the charcoal bed remains 90% efficient in

removing radioactive iodine following an accident. The technical specifications (Surveillance Requirement (SR) 3.6.4.3.2) require the system to be tested in accordance with the Ventilation Filter Testing Program (VFTP). TS 5.5.7, Ventilation Filter Testing Program (VFTP), requires that once every 24 months the licensee demonstrate that the heaters for the SGT System dissipate greater than or equal to 40 kW when tested in accordance with ANSI N510-1975.

On November 30, 2008 during normal operation of the 'A' SGT train to vent the drywell, annunciator 1-XA-55-22B-11, SGT Filter Bank 'A' Heating Element Power Loss, was received. The operators verified that the temperature of the system continued to increase and that the heater power on red light was lit. Based on these indications the operators misdiagnosed the issue as a malfunction of the alarm circuit. A work order (WO) was submitted but a PER was not initiated and the operability review was not documented. Initial troubleshooting on December 22, 2008 found the annunciator circuit was functioning properly, however evaluation of the operability of the system was not revisited nor was a PER initiated. Further troubleshooting on January 22, 2009 revealed that the alarm relay (relay 37C) to the 'C' heater had failed. This relay was a current sensing relay in series with the heater. Failure of this relay rendered the associated heater inoperable. With only two of the three heaters operational there was approximately 32.8 kW of heater capacity available for that subsystem. No reevaluation of the operability of the system was conducted and a PER was not initiated when the relay was found to have failed.

TS SR 3.6.4.1 required that each SGT subsystem be operated with its respective heaters for greater than or equal to 10 hours every 31 days. The surveillance procedure was inadequate in detecting this type of heater failure and the surveillance successfully passed for several months with the failed heater. The procedure verified that the red indicating light for the heater was on; however, this light only indicated that the heater circuit contactor coil was energized calling for heater operation, and did not directly measure current to the heaters. With the relay failed, the red light would be energized, but no power would be available to the heater. The inadequate procedure contributed to the condition lasting several months without detection and was entered into the licensee's corrective action program (PER 176243).

On June 17, 2009, prior to the scheduled repair of the relay, an operator submitted PER 174416 requesting additional guidance on monitoring system performance with the heater power failure alarm locked in. A system engineer evaluated the PER and determined that the relative humidity heater relay 37C had failed and that all three heaters were needed to meet the TS required 40 kW capacity. Operations declared the SGT subsystem inoperable on June 19, 2009 when they were notified of this condition by the system engineer. The relay was replaced and the system was restored to service on June 20, 2009.

Subsequent to the event, the licensee demonstrated that the accident analysis did not credit the SGT charcoal for iodine removal when determining post-accident off-site and on-site doses when the analysis was revised for use of an Alternate Source Term (AST). This methodology was approved by the NRC in a Safety Evaluation Report issued September 27, 2004 approving Amendment No. 251 to License No. DPR-33, Amendment No. 290 to License No. DPR-52, and Amendment No. 249 to License No. DPR-68. However, the licensee did not change the Technical Specification requirements regarding SGT charcoal or the associated heaters.

Analysis: From November 30, 2008 to June 19, 2009, the licensee failed to identify that the 'A' SGT Train was inoperable due to failure of a relay in the heater circuit when the SGT Filter Bank 'A' Heating Element Power Loss alarm was received in the control room, which was a performance deficiency. This resulted in not taking the actions required by Technical Specification 3.6.4.3, Standby Gas Treatment (SGT), i.e., to be in Mode 3 in 12 hours and Mode 4 in 36 hours for each Browns Ferry unit if an inoperable subsystem cannot be restored within 7 days.

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 50.34 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. This issue was entered into the licensee's corrective action program as PER 174597.

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)].

Enforcement: Technical Specification 3.6.4.3 requires that three SGT subsystems shall be operable and allows for one SGT subsystem to be inoperable for 7 days or all three units shall be placed in Hot Shutdown (Mode 3) within 12 hours and Cold Shutdown (Mode 4) in 36 hours. Contrary to this requirement, the 'A' SGT subsystem was not operable due to a heater failure for a period of greater than seven days, between November 30, 2008 and June 20, 2009, and the required TS actions for this inoperability were not taken. Because the finding is of very low safety significance and has been entered into the licensee's CAP as PER 174597, this violation is being treated as an NCV consistent with Section VI.A of the Enforcement Policy: NCV 05000259, 260, 296/2009006-01, "Standby Gas Treatment Subsystem 'A' Inoperable Beyond the Technical Specification Allowed Outage Time."

b. Assessment of Self-Assessments and Audits

(1) Inspection Scope

The inspectors reviewed licensee Quality Assurance (QA) audits conducted by the

Nuclear Assurance Department, and department self-assessments, including those which focused on problem identification and resolution, to verify that findings identified in the audits were entered into the CAP.

(2) Assessment

QA audits and departmental self-assessments were effective in identifying issues and directing attention to areas that needed improvement. Licensee identified weaknesses and issues in self-assessments were entered into the corrective action program and appropriately addressed. The team determined that the self-assessments and audits were critical and insightful at identifying issues and entering them into the corrective action program, e.g., they consistently identified problems such as inadequate management and supervisory oversight. The team reviewed the licensee's corrective actions associated with this issue and documented observations in the assessment of effectiveness of corrective actions and the assessment of progress in addressing the substantive cross-cutting issue. The team determined the self-assessments were thorough and comprehensive.

However, the team noted that corrective actions associated with identified weaknesses and issues were not always effectively implemented. Issues identified through the last two licensee self-assessments of the CAP include:

- Continued improvement is needed in the quality of apparent cause evaluations (ACEs) and timeliness of corrective action plans and actions.
- Several corrective actions to prevent recurrence associated with the substantive cross-cutting issue (SCCI) PER were not fully implemented as intended.
- Some Training Needs Analyses conducted as a result of PER corrective actions did not meet the requirements of training process instructions.
- PERs and PER actions closed to work orders not being cross referenced.
- PERs and PER actions inappropriately closed to work orders.
- PERs closed to other PERs do not meet the requirements of PIDP-9.
- Operability Evaluation conclusions do not always contain documentation to support operability with reference to applicable Technical Specification Basis, LCO, etc.

The team concluded that these issues identified through licensee self-assessments were indicators that the corrective action program has yet to achieve a desired level of effectiveness.

(3) Findings

No findings of significance were identified.

c. Assessment of Safety-Conscious Work Environment

(1) Inspection Scope

The team randomly interviewed 15 on-site workers regarding their knowledge of the corrective action program at Browns Ferry and their willingness to write PERs or raise safety concerns. During technical discussions with members of the plant staff, the

inspectors conducted interviews to develop a general perspective of the safety-conscious work environment at the site. The interviews were also conducted to determine if any conditions existed that would cause employees to be reluctant to raise safety concerns.

Additionally the inspection team performed an in office review of the licensee's safety culture analysis (PER 137614, Section IV). The review focused on the licensee's conclusions and proposed corrective actions to address any identified deficiencies in the overall safety culture at Browns Ferry.

(2) Assessment

Based on discussions conducted with the sample of plant employees, the team determined that the licensee management emphasized the need for all employees to identify and report problems using the appropriate methods established within the administrative programs. The inspectors also determined that employees felt free to raise issues and felt that management encouraged employees to place issues into the CAP for resolution.

The inspectors reviewed the proposed corrective actions associated with the identified contributing factors to the safety culture deficiencies (PER 137614). The inspectors considered the safety culture analysis to be both thorough and comprehensive. The inspectors also concluded that the proposed corrective actions to address the identified issues were commensurate with the deficiencies noted.

(1) Findings

No findings of significance were identified.

d. Assessment of Progress in Addressing the Substantive Cross-Cutting Issue

(1) Inspection Scope

The inspectors reviewed the licensee's progress on the implementation of corrective actions to address the SCCI identified in the NRC Annual Assessment Letter for the period of January – December 2007. The SCCI was identified in the problem identification and resolution area, in the aspect of appropriate and timely corrective actions (P.1 (d)) to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity. The NRC completed a PI&R inspection on October 2008 to assess, in part, the licensee's corrective actions for this substantive cross cutting-cutting issue. The October 2008 inspection team reviewed the licensee's root cause and common cause analyses, as well as a verification of the corrective actions that had been implemented, or scheduled to be implemented, to address each of the causes. However, the October 2008 team was unable to determine the effectiveness of the licensee's corrective actions based upon the brief period of time between the implementation of these corrective actions (documented in PER 136489) and the October 2008 PI&R inspection. Therefore, this subsequent PI&R inspection focused on the review of corrective actions that had been completed and the evaluation of their effectiveness through the review of representative samples and licensee self-assessments.

(2) Assessment

The team determined that in general, corrective actions for the SCCI were appropriate and effective to address the common causes identified in the licensee's evaluation of PER 136489. The licensee initiated corrective actions to prevent recurrence (CATPRs) and additional corrective actions to address the three common causes identified. The team found that all corrective actions were completed and there were opportunities to evaluate the effectiveness of the majority of those corrective actions. During the review of selected records and licensee self assessments, the team identified the following examples of ineffective corrective actions associated with the SCCI. Particularly, certain CATPRs were not fully effective or completely implemented as intended, as follows:

- The licensee completed CATPRs associated with the revision of work management system procedures to ensure WOs tied to PER corrective actions were not rescheduled or canceled without concurrence from the CARB or PSC. The team found that these corrective actions were not implemented as intended, in that the revised procedures did not provide adequate guidelines for both the rescheduling and cancellation of WOs. The licensee also identified this issue in a focused self-assessment performed prior to this inspection and took actions to correct the affected procedures. However, the team identified that a number of WOs tied to PER corrective actions were rescheduled without CARB or PSC approval after the CATPR was implemented. For example, three WOs initiated to implement CATPRs for PER 129719 were rescheduled without CARB or PSC concurrence. The licensee initiated PER 175467 to address this issue. The team considered this to be an administrative issue of minor significance that did not impact plant safety.
- Another change implemented in the work management system was the requirement to initiate PERs for all Corrective Maintenance Work Orders (CMWOs). Licensee self-assessment, BFN-SIT-F-09-001, "Effectiveness Review for Actions to Improve the BFN Corrective Action Program," identified hundreds of CMWOs that did not have associated PERs, even when the corrective actions were completed and effective. Additionally, the licensee focused self-assessment recognized that this CATPR was ineffective in ensuring that PERs were initiated for CMWOs. The licensee initiated PER 166283 to address this issue. The team reviewed every CMWO for which there was no associated PER, to determine if any operability issues existed. Although no operability issues were identified, this item is being treated as a licensee identified violation documented in section 4OA7 of this report.

The team also initiated CATPRs for training issues in the CAP key areas such as ACEs, RCEs, and responsibilities of CARB members, PSC members, and supervisors. The team reviewed training materials and qualification cards, and verified implementation of training by reviewing attendance records. The team found that these corrective actions were implemented as intended. To verify the effectiveness of the training, the team reviewed a sample of RCEs and ACEs performed after the training was implemented. The team found that fourteen PERs with ACEs failed the passing grade the first time they were presented to the PSC. These ACEs were revised along with their respective corrective action plans in order to meet the licensee's CAP standards. Among those ACEs, PER 156416 was initiated to address an unsatisfactory relay functional check on

4 kV Shutdown Board 'C.' The apparent cause "grading sheet" identified that the apparent cause was not clearly stated and no actions were initiated to address the extent of condition. The team found that the licensee revised the corrective action plan to address the "grading sheet" comments but the actions did not clearly reflect the planned actions to address the extent of condition. The licensee initiated PER 176462 to correct this issue. The team determined that the quality of ACEs had shown some improvement since the training was implemented, but the average ACE quality for the past few months was close to the passing criteria without an evident positive trend. The team did not identify additional quality issues within the selected RCEs and ACEs.

Additionally, the licensee implemented CATPRs to address deficiencies in the CAP procedures. Among these, corrective actions to provide guidance for RCEs performed by external organizations and RCEs for repeat significant events were completed. However, the assessment of their effectiveness was limited because there were no external RCEs or repeat significant events between the time the corrective actions were implemented and the completion of this PI&R inspection.

The licensee also initiated corrective actions to address other aspects of the common causes. These corrective actions included improvement of communications to managers and supervisors about the expectations for accountability, establishment of PSC and CARB review groups and performance measures for these groups, revision of Unit "Re-start Checklist" actions to verify completion of outage CATPRs, revision of functional evaluation procedures to add guidance on 10 CFR 50.59 reviews for temporary modifications, verification of PER initiation for all operator workarounds, and issuance of guidance for revision of operator time critical actions. The inspectors determined that these actions were fully implemented and no examples of ineffectiveness were identified during this inspection.

(3) Findings

No findings of significance were identified.

4OA6 Exit Meeting

On July 17, 2009, the inspectors presented the inspection results to Mr. R. West and Mr. S. Bono, respectively, and other members of the Browns Ferry staff who acknowledged the results. The inspectors confirmed that proprietary information was not provided or retained following the inspection.

4OA7 Licensee-Identified Violations

The following Green violation of very low safety significance was identified by the licensee and is a violation of NRC requirements which met the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for disposition as a NCV.

10 CFR 50, Appendix B, Criterion II requires, in part, that the licensee shall establish a quality assurance program and the program shall be documented by written policies, procedures and instructions and be carried out in accordance with those policies, procedures and instructions. SPP 6.1, "Work Order Process Initiation," specifies that PERs should be generated for all corrective maintenance work orders. Contrary to this, the licensee failed to implement SPP-6.1, in that several hundred corrective maintenance

work orders did not get associated PERs as directed in the procedure. The team determined that this issue was of very low safety significance because none of these corrective maintenance work orders resulted in an operability issue due to the failure to write PERs.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

S. Berry, Systems Engineering Manager
S. Bono, Director of Engineering
P. Chadwell, Operations Manager
J. Davenport, Licensing Engineer
F. Godwin, Licensing Manager
K. Harvey, RHRSW System Engineer
E. Johnson, System Engineer – EDG
J. Kennedy, Concerns Resolution Program Coordinator
J. Kulisek, Operations Procedures Supervisor
F. Loscalzo, Design Engineer
D. Matherly, Turnaround Plan – Performance Improvement Manager
J. McCarthy, Director of Safety and Licensing
J. Miskell, NSSS Supervisor
J. Mitchell, Site Security Manager
J. Moore, System Engineer – MS
E. Quinn, Performance Improvement Manager
J. Randich, General Manager of Operations
P. Sawyer, Radiation Protection Manager
K. Skinner, System Engineer – CRD
R. Stowe, Unit Supervisor
J. Walton, Radiation Protection Supervisor
R. West, Site Vice President
J. Whisenant, System Engineer – 480 V Breakers
A. Yarbrough, Raw Cooling Water Systems Lead Engineer

NRC

T. Ross, Senior Resident Inspector
C. Christensen, Deputy Director, Division of Reactor Safety

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000259, 260, 296/2009006-01 NCV Standby Gas Treatment Subsystem ‘A’ Inoperable
Beyond the Technical Specification Allowed Outage
Time (Section 4OA2.a)

Discussed

None

LIST OF DOCUMENTS REVIEWED

Procedures

MMDP-1, Maintenance Management System, Revision 14
MSI-0-001-VSL001, Reactor Vessel Disassembly and Reassembly, Revision 90
PIDP-1, PER Initiation, Rev. 0
PIDP-3, Operability and Reportability Reviews of PERs, Revision 0
PIDP-4, Corrective Action Program Screening and Oversight, Revision 2
PIDP-5, Apparent Cause Evaluations, Revision 1
PIDP-6, Root Cause Analysis, Revision 1
PIDP-7, PER Actions, Revision 1
PIDP-8, PER Operating Experience and Generic Reviews," Rev. 0
PIDP-9, PER Closure," Rev. 0
PIDP-10, PER Effectiveness Reviews," Rev. 0
PIDP-11, PER Trending," Rev. 0
PIDP-14, CAP Health Monitor," Rev. 0
SPP-1.0, Organization and Administration," Rev. 3
SPP-1.6, NPG Self-Assessment and Benchmarking Program," Rev. 16
SPP-3.1, Corrective Action Program, Revision 15
SPP-7.1, On Line Work Management, Revision 13
SPP-6.1, Work Order Process Initiation," Rev. 5
0-TI-363, ASME Section XI Repairs and Replacements, Revision 11
0-TI-395, Breaker Testing and Maintenance Program, Revision 5
0-TI-397, Performance of Maintenance Inspections and Verifications, Revision 9
OPDP-8, Limiting Conditions for Operation Tracking, Revision 2

Problem Evaluation Reports

PER 136489	PER 162127
PER 143225	PER 162139
PER 146189	PER 164165
PER 151814	PER 164499
PER 154248	PER 167302
PER 155118	PER 167303
PER 155291	PER 167305
PER 155697	PER 170053
PER 155705	PER 165228
PER 155837	PER 166299
PER 156416	PER 169830
PER 156797	PER 170689
PER 157017	PER 174416
PER 157327	PER 174597
PER 157536	PER 131878
PER 157918	PER 137614
PER 158581	PER 158304
PER 158587	PER 156416
PER 158860	PER 158928
PER 159837	PER 173643
PER 161347	PER 173623

PER 173447
 PER 153773
 PER 156819
 PER 176348
 PER 176402
 PER 158127
 PER 92437
 PER 131453
 PER 149762
 PER 131475
 PER 175833
 PER 158574
 PER 158574
 PER 168880

PER 157912
 PER 166658
 PER 166658
 PER 159606
 PER 141380
 PER 141380
 PER 175207
 PER 160754
 PER 160660
 PER 153836
 PER 141502
 PER 150482
 PER 161469
 PER 160537

Work Orders

WO 08-711069-000
 WO 08-724013-004
 WO 08-724013-005
 WO 08-724013-006
 WO 08-724013-007
 WO 09-710632-000
 WO 09-711020-000
 WO 09-711187-000
 WO 09-711187-001
 WO 09-711383-000
 WO 08-724625-000
 WO 08-723660-000
 WO 09-712146-000
 WO 09-714023-000
 WO 08-720167-000
 WO 09-714722-000
 WO 09-719218-000
 WO-08-724391-000
 WO-08-724496-000

Operator Workarounds

0-077-OWA-2006-0113
 0-077-OWA-2006-0114
 0-077-OWA-2007-0016
 1-073-OWA-2007-0074
 2-085-OWA-2008-0079

Maintenance Rule CDEs

CDE 722, DG C Div II Unit Priority Retrip Relay Failure
 CDE 729, Unit 1 RCIC Governor Valve Failure
 CDE 730, Unit 1 RCIC Steam Supply Valve Failure
 CDE 744, Unit 2 HPCI Steam Admission Valve Failure

Self-Assessments

BFN-SIT-F-09-001, Effectiveness Review for Actions Taken to Improve the Corrective Action Program – Browns Ferry Nuclear Plant
 BFN-SIT-S-09-003, BFN Trending Program to Industry Standard Practices
 BFN-SIT-S-09-006, Evaluation of Aspects of the Corrective Action Process for Compliance with Requirements
 BFN Turnaround Plan-Finding and Correcting Problems-PI.2-1
 BFN-SIT-F-09-001, Focused Self-Assessment Report, Effectiveness Review for Actions to Improve the BFN Corrective Action Program

Drawings

DWG 0-45E771-2, Wiring Diagram, 480V Diesel Aux Power Schematic Diagram, Rev.34

Other Documents

0-47W310-5, Powerhouse & Radwaste Building Units 1,2, & 3 - Mechanical Tanks, Revision 0
 0-47W585-2, Standby Diesel Generator Building - Mechanical Drains & Embedded Piping, Revision 4
 0-DTG-TCA, Interim Control of Time Critical Operator Actions
 0-SR-3.8.1.8, 480V Load Shedding Logic System Functional Test (Division II), Revision 8 (completed on 2/24/09)
 0-SSI-1-2, Verification & Validation of Appendix R Manual Actions
 BFN-SIT-F-09-001, Effectiveness Review for Actions Taken to Improve the BFN Corrective Action Program, June 5, 2009
 BP-122, Governance, Oversight, Execution and Support Program, Revision 7
 Browns Ferry - Emergency Diesel Generator System Vulnerability to Functional Failure Assessment, 03/9-27/09
 CAQ012.001, Apparent Cause Analysis Qualification, Revision 0
 CAQ012.002, Root Cause Analysis Qualification, Revision 0
 CAQ012.003, PSC/CARB Qualification - Cause Analysis, Revision 0
 CARB Observation Forms: 7/10/08 to 6/30/09
 CAT012.011, Apparent Cause Evaluation, Revision 0
 EDG System Health Report - 10/1/08 - 1/31/09
 EDMG Fire Protection Strategy Exercise - Assessment and Evaluation, March 4, 2008
 ElectroMotive Final Report for Teardown of Turbocharger from TVA, June 15, 2009.
 GEN121.000, CAP Job Familiarization Guideline - Cause Analysis, Revision 0
 "Memo from Rusty West (Site VP) to All Managers and Supervisors, Lessons Learned from our 95002 NRC Inspection Readiness Self-Assessment, September 11, 2008"
 Operator Logs for EDG related issues from October '08 - July '09
 OSIL-115, Operation Administrative Documentation, 09/28/07
 PSC Observation Forms: 7/10/08 to 6/30/09
 TNA No. 2008-136489CA8-001, Improve understanding of CAP key concepts, program requirements, and program tools, 8/18/08
 Training and Development Attendance Record for Operation Training Guide OTG 7 (SIMULATOR CONSOLE OPERATOR QUALIFICATION CHECKLIST), Revision 4, 9/18/08
 TVA Automated Training Information System, Report ID: TRN120, Apparent Cause Evaluation Training
 TVA Automated Training Information System, Report ID: TRN120, CARP/PSC Member Orientation Checklist

TVA Automated Training Information System, Report ID: TRN120, Cause Analysis
TVA Automated Training Information System, Report ID: TRN120, Root Cause Analysis/Human
Performance Enhancement System Workshop
TVA Automated Training Information System, Report ID: TRN120, Root Cause Development
Training
Unit 1 TS 3.6.4.3, Standby Gas Treatment (SGT) System, Amendment 251
Unit 1 TS 5.5.7, Ventilation Filter Testing Program (VFTP), Amendment 235
Unit 1 TS Bases B3.6.4.3, Standby Gas Treatment (SGT) System, Rev. 0
Browns Ferry FSAR, Section 5.3, Secondary Containment
BNF CARB Wednesday, July 01, 2009 package
Flow Diagram, Reactor Core Isolation Cooling System, 1-47E813-1, 2-47E813-1, 3-47E813-1
Wiring Diagram I&C DC&AC Power System Key Diagram, 0-45E710-1, 0-45E710-4, 0-45E710-
5, 0-45E710-7

PERs Generated as a Result of this Inspection

PER 176247, Failure to process a new procedure
PER 175467, Ineffective PER Corrective Action
PER 176462, PER 156416 Corrective action ambiguous with respect to extent of condition