



Memorandum from the Office of the Inspector General

September 3, 2008

William R. Campbell, LP 3R-C

**FINAL REPORT – INSPECTION 2008-11802 – REVIEW OF BROWNS FERRY
NUCLEAR PLANT UNIT 1 OPERATING ISSUES SINCE THE RESTART IN MAY 2007**

We reviewed certain Browns Ferry Nuclear Plant Unit 1 (BFN U1) operating issues that have occurred since the restart in May 2007. Our objectives were to (1) assess the root causes of the BFN U1 SCRAMs¹ that have occurred since the unit returned to service in May 2007, taking into consideration milestone achievements, and (2) obtain information on the cost to complete the BFN U1 restart project.

In summary, we found the operating issues were primarily caused by improper installation of a fitting during the restart project and another fitting during initial construction, original plant design errors, failure to identify the correct root cause of a previous issue in a timely manner, and failure to identify a missing wood support during walkdowns. The root causes for the SCRAMs appear to not be the result of work performed under project milestones tied to the Unit One Executive Compensation plan. In addition, we found the total cost of the BFN U1 project to be approximately \$1.8 billion through fiscal year (FY) 2007.

BACKGROUND

In May 2007, BFN U1, which was shut down in 1985, was restarted. The project took approximately five years to complete. During the first six months of operation, BFN U1 experienced five reactor SCRAMs. The number and frequency of the SCRAMs raised many questions with the NRC, and the unit was added to the NRC watch list with a yellow ranking. A yellow ranking requires additional oversight of the unit by the NRC.

The restart project included an executive compensation component for major milestones completed on schedule. The project planned 30 major milestones for FY 2005 that were reviewed and approved by the Chief Nuclear Officer. All 30 milestones were completed within the FY (15 ahead of schedule, 12 on schedule, and 3 late). According to documentation supplied by TVA management, two of the late milestones were impacted by plant conditions. Based on some concerns that were expressed regarding the completion of FY 2005 milestones, we initiated this review to ascertain if there was any correlation between the SCRAMs and the work conducted to complete project milestones.

¹ SCRAM stands for safety control rod axe man. The Nuclear Regulatory Commission (NRC) defines SCRAM as the sudden shutting down of a nuclear reactor, usually by rapid insertion of control rods, either automatically or manually by the reactor operator.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of our review were to (1) assess the root causes of the BFN U1 SCRAMs, taking into consideration milestone achievements, and (2) obtain information on the cost to complete the BFN U1 restart project. The scope of our review included the five Unit 1 SCRAMs that occurred following the restart and costs incurred through FY 2007. To achieve our objectives, we:

- Conducted interviews of current BFN employees, BFN U1 restart project employees, NRC personnel, and the five BFN root cause analysis team leaders assigned to each of the SCRAMS.
- Reviewed milestones to determine if the systems with operating issues could be tied to project milestones.
- Reviewed the Problem Evaluation Reports (PERs) and root cause analysis reports for each of the five SCRAMs to obtain information about each SCRAM.
- Obtained updated cost data from the Controller, Nuclear Power Group (NPG), to determine updated project cost information. We did not audit the cost information.

This inspection was conducted in accordance with the "Quality Standards for Inspections."

FINDINGS

We determined the root causes of the five SCRAMS varied, and we found nothing to indicate that the SCRAMs were a result of work performed or not performed in order to meet project milestone dates. Also, the total project cost through FY 2007 was about \$1.8 billion.

SCRAM Analysis

Our review of (1) root cause analysis reports, PERs, and other documentation, and (2) interviews with TVAN personnel found:

- The first SCRAM was caused by a flared fitting not correctly installed during original construction and inadequate application of the work control process in repairing the leak.
- The second SCRAM was caused by original design issues.
- The third SCRAM was caused by improper installation and inadequate assembly verification of a fitting during restart construction.
- The fourth SCRAM was caused by a missing wood support that allowed tubing to rub on a metal hanger. The rubbing wore a hole into the tube. In addition, inadequate preventive maintenance instructions were used to inspect the system as part of the system return-to-service process.
- The fifth SCRAM was caused by (1) design issues and (2) failure to identify the root cause and perform corrective actions from an earlier SCRAM in a timely manner.

In addition, TVA Nuclear personnel found numerous contributing factors to the SCRAMs. Some of the contributing factors included: (1) inadequate communication, (2) lack of knowledge and procedural guidance, (3) lack of rigorous worker practices, and (4) inadequate management oversight. Currently, management is taking actions to address all issues identified in the root cause analysis reports and PERs.

Based on our interviews and analysis, we found nothing to indicate that the SCRAMs resulted from work or project scope tied to FY 2005 milestone and Winning Performance achievements. Root cause analysis teams also found nothing to indicate the SCRAMs resulted from work performed to meet project milestones tied to Winning Performance.

BFN U1 Project Cost

Based on information provided by the NPG Controller, we found the cost of the BFN U1 project through FY 2007 to be approximately \$1.84 billion. This includes revenue credits and an adjustment for Allowance for Funds Used During Construction—AFUDC. There is an additional \$3 million budgeted for FY 2008; however, for FY 2008 year to date, a credit balance of \$2.1 million is reported. According to the NPG Controller, the FY 2008 credit is the result of Procurement selling excess inventory that, "cannot be used by WBN2 [Watts Bar Nuclear Plant Unit 2] or other TVA sites."

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This report is being provided for informational purposes only; therefore, no response is necessary. If you have any questions, please contact Gregory R. Stinson, Senior Auditor, at 423-365-2336 or Gregory C. Jaynes, Deputy Assistant Inspector General, Inspections, at 423-751-7821.



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OIG File No. 2008-11802