



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

July 23, 2013

Mr. Joseph W. Shea  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
1101 Market Street, LP 3D-C  
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT – NRC OPERATOR LICENSE  
EXAMINATION REPORT NOS 05000259/2013301, 05000260/2013301 AND  
05000296/2013301

Dear Mr. Shea:

During the period June 3 – 7, 2013, the Nuclear Regulatory Commission (NRC) administered operating tests to employees of your company who had applied for licenses to operate the Browns Ferry Nuclear Plant. At the conclusion of the tests, the examiners discussed preliminary findings related to the operating tests and the written examination submittal with those members of your staff identified in the enclosed report. The written examination was administered by your staff on June 28, 2013.

Three Reactor Operator (RO) and three Senior Reactor Operator (SRO) applicants passed both the operating test and written examination. Two RO applicants failed the operating test. There were three post-administration comments concerning the operating test. These comments, and the NRC resolution of these comments, are summarized in Enclosure 2. A Simulator Fidelity Report is included in this report as Enclosure 3.

The initial written SRO examination submitted by your staff failed to meet the guidelines for quality contained in NUREG-1021, Operator Licensing Examination Standards for Power Reactors, Revision 9, Supplement 1, as described in the enclosed report.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosures 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 Website at <http://www.nrc.gov/reading-rm.adams.html> (the Public Electronic Reading Room).

If you have any questions concerning this letter, please contact me at (404) 997-4436

Sincerely,

*/RA/*

Mark E. Franke, Chief  
Operations Branch 2  
Division of Reactor Safety

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

Enclosures:

1. Report Details
2. Facility Comments and NRC Resolution
3. Simulator Fidelity Report

(cc See page3)

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Letter to Joseph W. Shea from Mark E. Franke dated July 23, 2013

SUBJECT: BROWNS FERRY NUCLEAR PLANT – NRC OPERATOR LICENSE  
EXAMINATION REPORT NOS 05000259/2013301, 05000260/2013301 AND  
05000296/2013301

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 50-259, 50-260, AND 50-296

License No.: DPR-33, DPR-52, and DPR-68

Report No.: 05000259/2013301, 05000260/2013301, and 05000296/2013301

Licensee: Tennessee Valley Authority (TVA), LLC

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

Location: Athens, AL 35611

Dates: Operating Test – June 3 – 7, 2013  
Written Examination – June 28, 2013

Examiners: Bruno Caballero, Chief, Senior Operations Engineer, RII/DRS/OLB2  
Ken Schaaf, Operations Engineer, RII/DRS/OLB1  
Andreas Goldau, Operations Engineer, RII/DRS/OLB2  
Matt Emrich, Examiner-in-Training, TTC

Approved by: Mark E. Franke, Chief  
Operations Branch 2  
Division of Reactor Safety

## **SUMMARY OF FINDINGS**

ER 05000259/2013301, 05000260/2013301, and 05000296/2013301; operating test June 3 – 7, 2013, & written exam June 28, 2013; Browns Ferry Nuclear Plant, Operator License Examinations.

Nuclear Regulatory Commission (NRC) examiners conducted an initial examination in accordance with the guidelines in Revision 9, Supplement 1, of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." This examination implemented the operator licensing requirements identified in 10 CFR §55.41, §55.43, and §55.45, as applicable.

Members of the Browns Ferry Nuclear Plant staff developed both the operating tests and the written examination. The initial written SRO examination submittal did not meet the quality guidelines contained in NUREG-1021.

The NRC administered the operating tests during the period June 3 – 7, 2013. Members of the Browns Ferry Nuclear Plant training staff administered the written examination on June 28, 2013. Three Reactor Operator (RO) and three Senior Reactor Operator (SRO) applicants passed both the operating test and written examination. Four applicants were issued licenses commensurate with the level of examination administered. Issuance for two RO applicants has been delayed pending receipt of additional information.

There were three post-examination comments.

No findings were identified.

## REPORT DETAILS

### 4. OTHER ACTIVITIES

#### 4OA5 Operator Licensing Examinations

##### a. Inspection Scope

Members of the Browns Ferry Nuclear Plant staff developed both the operating tests and the written examination. All examination material was developed in accordance with the guidelines contained in Revision 9, Supplement 1, of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." The NRC examination team reviewed the proposed examination. Examination changes agreed upon between the NRC and the licensee were made per NUREG-1021 and incorporated into the final version of the examination materials.

The NRC reviewed the licensee's examination security measures while preparing and administering the examinations in order to ensure compliance with 10 CFR §55.49, "Integrity of examinations and tests."

The NRC examiners evaluated five Reactor Operator (RO) and three Senior Reactor Operator (SRO) applicants using the guidelines contained in NUREG-1021. The examiners administered the operating tests during the period June 3 – 7, 2013. Members of the Browns Ferry Nuclear Plant training staff administered the written examination on June 28, 2013. Evaluations of applicants and reviews of associated documentation were performed to determine if the applicants, who applied for licenses to operate the Browns Ferry Nuclear Plant, met the requirements specified in 10 CFR Part 55, "Operators' Licenses."

##### b. Findings

No findings were identified.

The NRC determined that the licensee's examination submittal was outside the range of acceptable quality specified by NUREG-1021. The initial written examination submittal was outside the range of acceptable quality because more than 20% (8 of 25 sampled) of the SRO questions sampled for review contained unacceptable flaws. Individual questions were evaluated as unsatisfactory for the following reasons:

- Five questions contained two or more implausible distractors.
- Two questions on the SRO examination were not written at the SRO license level.
- One question failed to meet the K/A statement contained in the examination outline.

The NRC regional office returned the entire written examination, containing 100 questions, to the licensee for rework and correction in accordance with NUREG-1021. Administration of the written examination was delayed, in part, because the quality of the licensee's examination submittal was unacceptable. Future examination submittals need to incorporate lessons learned.

Three RO applicants and three SRO applicants passed both the operating test and written examination. Two RO applicants passed the written examination but did not pass the operating test. One RO applicant and three SRO applicants were issued licenses. Issuance of the licenses for two RO applicants has been delayed pending receipt of additional information. Details concerning the need for additional information have been sent to the individual applicants and the facility licensee.

The following generic weaknesses were discussed at the exit meeting:

- The RO applicants' performance during plant evolutions with the reactor at low power was weak. For example, administrative log taking in Mode 5, response to a feed pump trip during a startup scenario, and adjustment of the cool down rate using integrated computer screens during shutdown cooling operations.
- The RO and SRO applicants' implementation of the requirement to stop rod withdrawal prior to reaching the rod block monitor (RBM) set point was weak. That is, the applicants failed to stop rod withdrawals prior to receiving the RBM High/Inop alarm.

Copies of all individual examination reports were sent to the facility Training Manager for evaluation of weaknesses and determination of appropriate remedial training.

The licensee submitted three post-examination comments concerning the operating test. A copy of the final written examination and answer key, with all changes incorporated, and the licensee's post-examination comments may be accessed not earlier than July 9, 2015, in the ADAMS system (ADAMS Accession Number(s) ML13191A869, ML13191A879, and ML13191A882.

#### 4OA6 Meetings, Including Exit

##### Exit Meeting Summary

On June 7, 2013 the NRC examination team discussed generic issues associated with the operating test with Lang Hughes, Operations Manager, and members of the Browns Ferry Nuclear Plant staff. The examiners asked the licensee if any of the examination material was proprietary. No proprietary information was identified.

## **KEY POINTS OF CONTACT**

### Licensee personnel

Lang Hughes, Operations Senior Manager  
James Emens, Site Licensing Manager  
Steve Austin, Licensing Manager  
Russell Joplin, Corporate Training Director  
Daniel Laing, Site Training Director  
Hal Higgins, Nuclear Operations Training Supervisor  
Doug Hakenewerth, Operations Shift Manager

### NRC personnel

Dave Dumbacker, NRC Senior Resident Inspector

## FACILITY POST-EXAMINATION COMMENTS AND NRC RESOLUTIONS

A complete text of the licensee's post-examination comments can be found in ADAMS under Accession Number ML13191A882.

Item #1: Walk-Through – Job Performance Measure (JPM) Administrative Topic “b”, SR-2 Operator Logs in Mode 5

### Comment

The licensee recommended that Steps 5 and 8 of this JPM were NOT critical steps.

- The licensee's basis for why JPM Step 5 was not a critical step was that the applicability listed in SR-2, Instrument Checks and Observations, Table 4.5, Mode Switch Position, was:
  - Mode 5 with the Reactor Mode Switch in the REFUEL position and any control rod withdrawn OR
  - Mode 4 when in Special Operation LCO 3.10.4

Because the actual plant condition presented to the applicants (on the simulator) was that the Mode Switch was locked in the REFUEL (Mode 5) position, with all rods fully inserted, the licensee contended that the applicant could record either “SAT” or “NOT APPLICABLE” for JPM Step 5.

- The licensee's basis for why JPM Step 8 was not a critical step was that the actual plant condition presented to the applicants (on the simulator) was the vessel head removed and the cavity flooded to greater than 22 feet above the RPV flange. The licensee contended that the potential for thermal stratification could not, and did not, exist; therefore, performing the RPV differential temperature calculation in JPM Step 8 was not critical.

### NRC Resolution

The licensee's recommendation was accepted.

For this administrative JPM, the applicant was expected to perform operator logs in accordance with SR-2, Instrument Checks and Observations, for Tables 4.1 through 4.7 while the unit was in Mode 5, Refueling, and use the table notes to determine whether acceptance criteria was satisfied. The following items were required to be logged and identified by the applicant:

- Table 4.1, IRM Instrumentation
- Table 4.2, SRM Instrumentation (identify 'A' SRM inoperable; critical step)
- Table 4.3, Level Instrumentation
- Table 4.4.a, Control Rod Position
  - write “All Rods In” for Column A (critical step)
  - write “not applicable” for Column B (critical step because local observation of hydraulic control unit (HCU) pressure indicator was not required when all rods were inserted)

- JPM Step 5: Table 4.5, Mode Switch Position
- Table 4.6, Reactor Coolant Conductivity (record between 4 – 6  $\mu$ mhos; critical step)
- Table 4.7, Part 1, RHR Shutdown Cooling (SDC) (identify flow requirements not met; critical step)
- JPM Step 8: Table 4.7, Part 2, Vessel Differential Temperature (Record the bottom and top RPV temperatures, then subtract to obtain the overall RPV temperature difference)

NUREG-1021, Operator Licensing Examination Standards for Power Reactors, Rev.9, Supplement 1, Appendix C, JPM Guidelines, Section B.3 requires that every procedural step that the examinee must perform correctly (i.e., accurately, in the proper sequence, and at the proper time) in order to accomplish the task standard shall be identified as a *critical step*. The task standard was to perform operator logs in accordance with SR-2, Instrument Checks and Observations, for log tables 4.1 through 4.7 and to verify acceptance criteria were satisfied in accordance with notes.

For JPM Step 5, because no control rods were withdrawn, Table 4.5, Mode Switch Position was not required to be performed. Therefore, completion of JPM Step 5 was not required to accomplish the task standard because, with all rods fully inserted, Table 4.5 was not applicable.

For JPM Step 8, the actual plant condition presented to the applicants (on the simulator) was the vessel head as removed and the cavity flooded to greater than 22 feet above the RPV flange. The actual temperature difference across the RPV (bottom to top) was 10.9 °F. Based on Note 6, a temperature differential  $\geq 50^\circ\text{F}$  was indicative of inadequate mixing and stratification of the water in the RPV; however, this value was impossible to achieve since the vessel head was removed and cavity flooded. Because the plant condition presented to the applicants (on the simulator) was not affiliated with a situation where thermal stratification could ever occur, performance of JPM Step 8 was determined to be not critical.

Item #2: Walk-Through – Job Performance Measure (JPM) Administrative Topic “a”, Work Hour Limitations – SRO Version

#### Comment

The licensee recommended that a typographical error existed in the standard for JPM Step 1.

The basis for the licensee’s recommendation was that the operator first exceeded the 72 hours in a 7 day period work limitation on April 20 at 15:00. The licensee contended that standard for this JPM step incorrectly listed that the operator first exceeded this work hour limitation on April 20 at 11:00.

#### NRC Resolution

The licensee’s recommendation was accepted.

For this administrative JPM, the applicant was expected to analyze two operators’ work schedules and identify the date and time that one reactor operator exceeded 72 work hours in a 7 day period (critical step). Additionally, the applicant was expected to identify the date and time that the same operator also failed to meet the requirement for 3 days off in a 15 day period (critical step).

After identifying the date and times of the reactor operator's non-compliance with the Fatigue Rule, the applicant was expected to:

- Notify the Nuclear Fatigue Rule (NFR) Administrator, Operations Manager, and Site NFR Subject Matter Expert (critical step).
- Generate a problem evaluation report (PER) (critical step)
- Determine that Tech Spec 5.2.2, Unit Staff, required another operator to replace the operator within 2 hours, because control room staffing was below minimum (critical step).

The examiners verified, based on the work schedules presented to the applicants, the operator first exceeded the 72 work hour in a 7 day period work limitation on April 20<sup>th</sup> at 15:00 and the same operator also failed to meet the requirement for 3 days off in a 15 day period on April 20<sup>th</sup> at 07:00. Therefore, the licensee's recommendation that the standard for JPM Step 1 contained a typographical error was accepted.

Item #3: Walk-Through – Job Performance Measure (JPM) Systems – Control Room Topic “e”, Verify Traversing Incore Probe (TIP) Isolation

#### Comment

The licensee recommended that Steps 6 and 12 of this JPM were NOT critical steps.

For JPM Step 6, the licensee contended that placing the Manual TIP Drive Control Switch to the OFF position, after the TIP had been manually retracted, was not a critical step because the in-shield limit switch turned off the detector drive motor. Because the detector drive motor was stopped by the in-shield limit switch, the licensee contended that JPM Step 6 was not a critical step.

For JPM Step 12, the licensee contended that placing the TIP C & E Manual Valve Control Switches to the CLOSED position was not critical because the ball valve had already automatically closed for TIP C and because the shear valve was activated for TIP E.

#### NRC Resolution

The licensee's recommendation was accepted.

For this JPM, the applicant was expected to recognize that TIP detectors A, B, D, and E failed to automatically retract (TIP C did auto-retract) and then manually retract and isolate TIPs in accordance with 2-AOI-64-2E, Traversing Incore Probe Isolation. The applicant was also expected to identify that TIP E failed to manually retract and then activate its associated explosive shear valve. The following expected actions were designated as critical steps in the JPM:

- Place Mode Switch to the MANUAL position for TIP drives A, B, D, and E
- Place the Manual Switch to the REV position for TIP drives A, B, D, and E (identifying TIP E fails to retract)
- JPM Step 6: Return the Manual Switch to the OFF position for TIP drives A, B, D, and E
- Place Man Valve Control Switch to the CLOSED position for TIP drives A, B, and D
- Obtain key PA-235

- Insert key into the key lock switch for the TIP E shear valve and turn the key to the FIRE position
- JPM Step 12: Place all five TIP MAN VALVE CONTROL switches in CLOSED position

NUREG-1021, Operator Licensing Examination Standards for Power Reactors, Rev.9, Supplement 1, Appendix C, JPM Guidelines, Section B.3 requires that every procedural step that the examinee must perform correctly (i.e., accurately, in the proper sequence, and at the proper time) in order to accomplish the task standard shall be identified as a *critical step*. The task standard was 1) TIPs A, B, and D are manually driven inward and their associated ball isolation valves closed after the TIP was moved to the In-Shield position and 2) the TIP E shear valve was activated.

For JPM Step 6, an in-shield position limit switch de-energized the detector drive motor. Therefore, placing the Manual Switch to the OFF position was not required to complete the task. JPM Step 6 was not a critical step.

For JPM Step 12, placing the MAN VALVE CONTROL switch to the CLOSED position for TIP C was not critical because TIP C had already automatically retracted and its ball isolation valve was already closed, based on the initial plant conditions (on the simulator) presented to the applicants. Placing the MAN VALVE CONTROL switch to the CLOSED position for TIP E was not critical because TIP E was manually isolated via the explosive shear valve, which effectively isolates the TIP penetration. TIPs A, B, and D MAN VALVE CONTROL switches had already been placed to the CLOSED position in a previous procedure step. Therefore, JPM Step 12 was not a critical step.

## SIMULATOR FIDELITY REPORT

Facility Licensee: Browns Ferry Nuclear Plant

Facility Docket No.: 50-259, 50-260, AND 50-296

Operating Test Administered: June 3 – 7, 2013

This form is to be used only to report observations. These observations do not constitute audit or inspection findings and, without further verification and review in accordance with Inspection Procedure 71111.11 are not indicative of noncompliance with 10 CFR 55.46. No licensee action is required in response to these observations.

During the onsite preparatory visit during the period of May 6 - 10, 2013, the examiners observed the following:

<u>Item</u>	<u>Description</u>
Problem Report # 5348	U2 simulator FW flow oscillations at low power during scenario validation