September 20, 2005

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 — ISSUANCE OF AMENDMENT REGARDING ALTERNATIVE MEANS FOR MONITORING CONTROL OR SHUTDOWN ROD POSITION (TAC NO. MC1419) (WBN-TS-03-12)

Dear Mr. Singer:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 58 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated November 21, 2003, as supplemented by letters dated May 5 and August 19, 2004, and July 11, 2005 (TVA-WBN-TS-03-12).

The amendment changes plant Technical Specification (TS) 3.1.8 to allow the position of the control and shutdown rods to be monitored by a means other than the movable incore detectors. This alternate method will reduce the excessive wear on the movable incore detector system that is used to complete other required TS surveillances.

A copy of the staff's Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/
Douglas V. Pickett, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 58 to License No. NPF-90
2. Safety Evaluation

cc w/enclosures: See next page

September 20, 2005

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 — ISSUANCE OF AMENDMENT REGARDING ALTERNATIVE MEANS FOR MONITORING CONTROL OR SHUTDOWN ROD POSITION (TAC NO. MC1419) (WBN-TS-03-12)

Dear Mr. Singer:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 58 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application dated November 21, 2003, as supplemented by letters dated May 5 and August 19, 2004, and July 11, 2005 (TVA-WBN-TS-03-12).

The amendment changes plant Technical Specification (TS) 3.1.8 to allow the position of the control and shutdown rods to be monitored by a means other than the movable incore detectors. This alternate method will reduce the excessive wear on the movable incore detector system that is used to complete other required TS surveillances.

A copy of the staff's Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/
Douglas V. Pickett, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 58 to License No. NPF-90
2. Safety Evaluation

cc w/enclosures: See next page

DISTRIBUTION:

PUBLIC	RidsOgcRp	AHowe
PDII-2 RF	RidsAcrsAcnwMailCenter	JNakoski
RidsNrrDlpmLpdii	GHill (2 Hard copies)	TBoyce
RidsNrrDlpmLpdii2	RidsNrrDlpmDpr	MBarillas
RidsNrrPMDPickett (Hard Copy)	MVaaler (Hard Copy)	HLi
BClayton (Hard copy)	RidsRgn2MailCenter (SCahill)	

ADAMS Accession No.: ML052300162 TS: ML052650061
Package No.: ML052300201 *No Legal Objection NRR-058

OFFICE	LPD2-2	PM: LPD2-2	LA: LPD2-2	SC: EEIB-A	SC: SRXB-B	SC: IROB-A	OGC	SC: LPD2-2
NAME	MVaaler	DPickett	BClayton	AHowe	JNakoski	TTjader for TBoyce	MBupp*	EHackett for MMarshall
DATE	8/30/05	9/2/05	8/30/05	by memo dated 7 / 26 / 05	by memo dated 7 / 26 / 05	9/12/05	9/20/05	9/20/05

OFFICIAL RECORD COPY

cc:
Mr. Ashok S. Bhatnagar, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Larry S. Bryant, General Manager
Nuclear Engineering
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Robert J. Beecken, Vice President
Nuclear Support
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Michael D. Skaggs
Site Vice President
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

General Counsel
Tennessee Valley Authority
ET 11A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. John C. Fornicola, Manager
Nuclear Assurance and Licensing
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Glenn W. Morris, Manager
Corporate Nuclear Licensing
and Industry Affairs
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Paul L. Pace, Manager
Licensing and Industry Affairs
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Mr. Jay Laughlin, Plant Manager
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Senior Resident Inspector
Watts Bar Nuclear Plant
U.S. Nuclear Regulatory Commission
1260 Nuclear Plant Road
Spring City, TN 37381

County Executive
375 Church Street
Suite 215
Dayton, TN 37321

County Mayor
P. O. Box 156
Decatur, TN 37322

Mr. Lawrence E. Nanney, Director
Division of Radiological Health
Dept. of Environment & Conservation
Third Floor, L and C Annex
401 Church Street
Nashville, TN 37243-1532

Ms. Ann P. Harris
341 Swing Loop Road
Rockwood, Tennessee 37854

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

WATTS BAR NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 58
License No. NPF-90

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (the licensee) dated November 21, 2003, as supplemented by letters dated May 5 and August 19, 2004, and July 11, 2005, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (I) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. NPF-90 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 58, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. TVA shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance, to be implemented no later than 30 days after the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA by Edwin M. Hackett for/
Michael L. Marshall, Jr., Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: September 20, 2005

ATTACHMENT TO LICENSE AMENDMENT NO. 58

FACILITY OPERATING LICENSE NO. NPF-90

DOCKET NO. 50-390

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE	INSERT
3.1-17	3.1-17
3.1-18	3.1-18
3.1-19	3.1-19

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 58 TO FACILITY OPERATING LICENSE NO. NPF-90

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-390

1.0 INTRODUCTION

By application dated November 21, 2003 (NRC ADAMS No. ML033320395), as supplemented by letters dated May 5, and August 19, 2004 (ML041310373, ML042360714), and July 11, 2005 (ML051950284), Tennessee Valley Authority (TVA, the licensee) proposed a license amendment request (LAR) for Watts Bar Nuclear Plant (WBN), Unit 1, that would change plant Technical Specification (TS) 3.1.8, "Rod Position Indication," to allow for the position of a control or shutdown rod to be monitored by a means other than the movable in-core detectors. This alternate method will reduce wear on the movable incore detector system that is used to complete other required TS surveillances.

Currently, WBN TS 3.1.8 specifies that with one analog rod position indicator (ARPI) per group inoperable for one or more rod groups, the required action is to verify the position of the rods with inoperable position indicators using the movable incore detectors once per 8 hours or reduce the thermal power to less than 50 percent rated thermal power (RTP). The proposed alternate method will review the parameters of the rod control system for indications of rod movement, for any rod with an inoperable position indicator, once per 8 hours to ensure the position of the rod is known and adequate shutdown margin (SDM) is available. If unintended movement of the rod is detected, the movable incore detectors will be used to determine the actual position of the rod within 8 hours. Additionally, WBN will verify the position of the rod with the inoperable ARPI using movable incore detectors (1) if the rod with the inoperable position indicator is moved greater than 12 steps, (2) prior to increasing thermal power above 50 percent RTP, and (3) within 8 hours of reaching 100 percent RTP.

2.0 BACKGROUND

Mechanical or electrical failures may cause a control rod to become inoperable or to be misaligned from its group. Due to radiological concerns, a failed ARPI may not be repairable during plant operations. The required actions for Condition A of TS 3.1.8 require the verification of rod position using the movable incore detectors every 8 hours. If a licensee chooses to defer repair of a failed ARPI to the next scheduled refueling outage, the 8-hour rod position verification required by TS 3.1.8 would need to be continually repeated for weeks or months. This could result in excessive wear of the movable incore detectors. In anticipation of such a scenario, the licensee proposed a revision to TS 3.1.8 that would allow the position of the control and shutdown rods to be monitored by a means other than the movable incore

detectors. The licensee intends, by a temporary alteration (TA), to monitor the stationary gripper coil and the lift coil in the rod control system, and to have the status indicated by a plant computer recorder on the control board. With the TA in place, the licensee will have a temporary repair for the inoperable ARPI system until the unit enters Mode 5, Cold Shutdown, when a permanent repair could be performed.

Florida Power & Light Company (Turkey Point Nuclear Plant, Unit 4) submitted a similar amendment request on July 29, 2002. Carolina Power and Light Company (Robinson Nuclear Plant, Unit 2) also submitted a similar request on January 16, 2003. Both Turkey Point and Robinson had an inoperable ARPI and requested an exigent TS change in order to reduce wear on the moveable incore detectors. Both cases were approved as exigent TS amendments and were only applicable for the duration of the existing operating cycle or until a shutdown of sufficient duration occurred so that appropriate repairs could be made. The Turkey Point amendment was approved on August 20, 2002 (ML022320484), and the Robinson amendment was approved on February 13, 2003 (ML030440663).

The Watts Bar application is different from the Turkey Point and Robinson applications described above in that Watts Bar currently does not have an inoperable ARPI and the proposed TS change would not be limited to a single operating cycle. Thus, the Watts Bar application is anticipatory and will provide an alternative means to provide control rod position indication if an ARPI would become inoperable.

3.0 REGULATORY EVALUATION

The objectives of the control rod system are to ensure that control rod alignment and insertion limits are maintained. Operators utilize the ARPI to monitor the positions of the rods to establish that the plant is operating within the bounds of the accident analysis assumptions. The *operability*, including position indication, of the shutdown and control rods is an initial assumption in all safety analyses that assume rod insertion upon a reactor trip. Maximum rod misalignment is an initial assumption in the safety analysis that directly affects core power distributions and assumptions of available SDM. Control rod inoperability or misalignment may cause increased power peaking due to the asymmetric reactivity distribution and a reduction in the total available rod worth for reactor shutdown.

According to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, General Design Criteria (GDC) 13, “Instrumentation and Controls,” instrumentation to monitor variables and systems over their operating ranges during normal operation, anticipated operational occurrences, and accident conditions must be *operable*. WBN TS 3.1.8 requires *operability* of the control rod position indicators to determine the control rod position, and thereby ensure compliance with the control rod alignment and insertion limits.

GDC 26, “Reactivity Control System Redundancy and Capability,” states that two independent reactivity control systems of different design principles shall be provided. One of the systems shall use control rods and shall be capable of reliably controlling reactivity changes to assure that under conditions of normal operation, including anticipated operational occurrences, and with appropriate margin for malfunctions such as stuck rods, specified acceptable fuel design limits are not exceeded. The second reactivity control system shall be capable of reliably

controlling the rate of reactivity changes resulting from planned, normal power changes to ensure acceptable fuel design limits are not exceeded. One of the systems shall be capable of holding the reactor core subcritical under cold conditions.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the licensee's application to verify that the proposed changes comply with the WBN Unit 1 licensing basis criteria stated in section 15.2.3 of the Updated Final Safety Analysis Report (UFSAR). Specifically, the transients reviewed for this amendment were a rod drop and rod misalignment during power operation. The NRC staff used NUREG-0800, "Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants LWR [Light-Water Reactor] Edition," as guidance during the review.

4.0 TECHNICAL EVALUATION

4.1 Background

TS 3.1.8 ensures the rod position indicators are capable of determining the positions of the control and shutdown rods. The axial position of shutdown rods and control rods are determined by two separate and independent systems:

- the bank demand position indication (BDPI) system (group step counter), and
- the ARPI system.

The BDPI system counts the pulses from the rod control system that moves the rods. The BDPI system is considered highly precise (plus or minus 1 step or plus or minus 5/8 inch). The ARPI system provides an accurate indication of actual rod position, but at a lower precision than the step counter. This system is based on inductive analog signals from a series of coils spaced along a hollow tube with a center to center distance of 3.75 inches, which is 6 steps. The normal indication accuracy of the ARPI system is plus or minus 6 steps, and the maximum uncertainty is plus or minus 12 steps (plus or minus 7.5 inches). The operators utilize the ARPI system to monitor the position of the rods in order to establish that the plant is operating within the bounds of the accident analysis assumptions. Should a technical problem with ARPI components inside containment arise, no further action can be taken until the plant enters Mode 5, Cold Shutdown. This is due to the adverse radiological and temperature environment that exists in the reactor head area. Shutdown of the unit to Mode 5 solely to implement needed ARPI repairs is considered inappropriate since other options for monitoring the status of the rods are available.

When an ARPI per group is inoperable, TS 3.1.8 requires verification of the position of the rod with an inoperable position indicator using the movable incore detectors every 8 hours. The proposed amendment adds an alternate method to monitor rod position and limits this alternate method to only one inoperable ARPI per rod group until the end of the operating cycle, when the inoperable ARPI must be repaired. The licensee proposes monitoring the status of the stationary gripper coil and the lift coil in order to monitor the position of a rod with a failed ARPI once the position of the rod is initially confirmed through use of the movable incore detectors. The licensee plans to display the failed rod status on a control board recorder until the unit enters Mode 5 and repairs to the system can be safely implemented. The proposed TS

changes will alleviate a concern regarding the potential for excessive wear of the incore system due to use of the movable incore detectors every 8 hours, as is currently required by TS 3.1.8 Action A.1.

4.2 Proposed Technical Specifications Changes

The licensee proposed the following plant TS changes to TS 3.1.8, Rod Position Indication:

(1) Add Required Actions A.2.1, "Verify the position of the rod with the inoperable position indicator by using movable incore detectors." AND A.2.2, "Review the parameters of the rod control system for indications of unintended rod movement for the rod with an inoperable position indicator."

The Completion Time for Action A.2.1 is 8 hours AND once every 31 days thereafter AND 8 hours, if rod control system parameters indicate unintended movement. The Completion Time for Action A.2.2 is 16 hours AND once per 8 hours thereafter.

The options provided by required actions A.2.1 and A.2.2 allow for continued operation in a situation where the component causing the ARPI to be inoperable is inaccessible due to operating conditions (adverse radiological or high temperature environment). In this situation, repair of the ARPI cannot occur until the unit is in Mode 5.

(2) Add Required Action A.2.3, "Verify the position of the rod with an inoperable position indicator by using movable incore detectors." The Completion Time for Action A.2.3 is 8 hours, if the rod with an inoperable position indicator is moved greater than 12 steps AND prior to increasing THERMAL POWER above 50 percent rated thermal power (RTP) and within 8 hours of reaching 100 percent RTP.

Required Action A.2.3 addresses two contingency measures when the temporary alteration (TA) is used: The first contingency - the rod group alignment limits of LCO [limiting condition for operation] 3.1.5 require that all shutdown and control rods be within 12 steps of their group step counter demand position. The limits on shutdown or control rod alignments ensure that the assumptions in the safety analysis will remain valid. The second contingency - the reduction of thermal power to less than or equal to 50 percent RTP puts the core into a condition where rod position is not significantly affecting core peaking factors.

Required Actions A.2.1, A.2.2, and A.2.3 are modified by a note. The note clarifies that rod position monitoring by Required Actions A.2.1 and A.2.2 may only be applied to one inoperable ARPI per rod group and shall only be allowed: (1) until the end of the current cycle, or (2) until an entry into Mode 5 of sufficient duration, whichever occurs first, when the repair of the inoperable ARPI can safely be performed. Required Actions A.2.1, A.2.2, and A.2.3 shall not be allowed after the plant has been in Mode 5 or other plant condition, for a sufficient period of time, in which the repair of the inoperable ARPI could have safely been performed.

(3) Re-number the current REQUIRED ACTION A.2 to A.3, and add the phrase “less than or equal to” to REQUIRED ACTION A.3 that reads “Reduce Thermal Power to less than or equal to 50% RTP.”

(4) Add the phrase “less than or equal to” to REQUIRED ACTION B.2, that reads “Reduce THERMAL POWER to less than or equal to 50% RTP.”

(5) Add the phrase “less than or equal to” to REQUIRED ACTION C.1.2, that reads “Verify the most withdrawn rod and the least withdrawn rod of the affected banks are less than or equal to 12 steps apart.”

(6) Add the phrase “less than or equal to” to REQUIRED ACTION C.2, that reads “Reduce THERMAL POWER to less than or equal to 50% RTP.”

The staff’s evaluation of these proposed changes are addressed in the following sections.

4.3 Evaluation of the Proposed TS Change

4.3.1 System Description

The WBN analog rod position indication system is composed of two separate and independent systems: the individual rod position system and the demand position system. The individual rod position indication system measures the actual rod position using a transformer type transducer, mounted concentrically with the rod drive pressure housing. The demand position system counts the number of steps demanded by the rod control system to move the rods up or down. Both the individual rod position indications and the information from the step counters are displayed on the main control board. The two systems serve as backups to one another. Operating procedures require the operator to compare the demand and actual position indicators during normal operation and upon recognition of any apparent malfunctions. Computer monitoring of the two types of indicators actuates an alarm if a significant deviation between the two occurs.

The licensee stated that Design Change Notice 51072 was implemented during the Cycle 5 refueling outage and upgraded the existing ARPI system in October 2003. Portions of the previous system were replaced with a new system called the computer enhanced rod position indication (CERPI) system. The existing rod position detectors and associated field cabling remain intact. The main control room (MCR) indicators, rod bottom lights, and rod speed indicators on the MCR panel were replaced with two redundant liquid crystal flat panel displays. The ARPI processing equipment was upgraded to programable logic based controllers and new detector interface boards were installed. The new system includes a maintenance terminal in one of the auxiliary instrument room racks for accessing system diagnostics and calibrations.

In case of rod position indicator failure and entrance into TS LCO 3.1.8, Condition A, the operator first uses the incore detectors to locate the rod with the inoperable ARPI. The current TS requires that the position of the rods with inoperable position indicators be verified using the movable incore detector system every 8 hours. The licensee proposes to monitor the test point voltage of the stationary gripper coil and the lift coil of the affected control rod drive mechanism. The alternate method will only be used until the unit enters Mode 5 and repairs to the system can be safely implemented.

By letter dated May 5, 2004, the licensee provided a detailed description of the alternate monitoring method, including components relied upon in the alternate method. The alternate monitoring method continuously samples current flow to the stationary gripper coil for the rod with a nonfunctional ARPI. This is accomplished using permanently installed test points in the power cabinet located in the control rod drive room. The current is converted to a low-level voltage signal inside the power cabinet. A temporary cabling transfers the low level signal from the test points in the power cabinet to a time response test box. There is a permanent cabling that transmits the signal from the time response test box in the control rod drive room to another time response test box in the auxiliary instrument room. A second temporary cabling will be used to transmit the signal to an electronic rack that provides an interface with the plant computer. The plant computer digitizes the analog input and uses it to determine if current is being applied to the stationary gripper for the affected rod (a non-zero signal) or if the gripper is de-energized (a zero signal). The plant computer provides an output signal representative of rod position in steps to a digital recorder located on a control board in the MCR. The digital recorder is located adjacent to the displays for the ARPIs.

During rod motion, the stationary gripper coils of the rod group in motion alternate between reduced current, full current (approximately 8 amps or 500 mV), and zero current. The pattern is very distinct, and highly repeatable. With full or reduced current applied to the stationary gripper coils, the rods cannot move. When the stationary gripper current falls to zero, the stationary gripper releases the jack shaft, and the movable and lift coils act together to cause the rods to step in or out. Following the step, the stationary coil resumes operating at reduced current. If the stationary gripper coil current does not fall to zero, then the rod cannot move, barring a mechanical failure between the stationary gripper and the jack shaft. If the stationary current falls below a threshold based on the reduced current signal, then the rod can move. If the stationary coil signal returns above the threshold within a fixed amount of time, then the signal implies that a rod step was taken versus a rod drop.

Each time the plant computer detects a drop below the threshold for stationary gripper coil current, a software algorithm will begin a timer. If the current signal does not return above the threshold within a fixed amount of time, the plant computer will generate an alarm indicating the possibility of a dropped rod or a failure in the alternate method of monitoring rod position. Similarly, a failure in any portion of the alternate monitoring method will result in the plant computer generating an alarm indicating that the alternate method can no longer adequately monitor the position of the rod. This will require using the incore detectors in accordance with TS required Action A.1 or required Action A.2.1. The 8-hour frequency will start immediately.

4.3.2 Evaluation of the Proposed Changes

The proposed alternate method will be treated as a TA if TVA chooses to perform TS 3.1.8 Action Statement A.2.1 instead of TS Action Statement A.1. In their letter dated July 11, 2005, the licensee stated that it will implement the changes to the ARPI circuit to install the alternate monitoring equipment as a TA in accordance with TVA Standard Programs and Processes 9.5, “Temporary Alteration.” A 10 CFR 50.59 screening review is performed whenever the TA is implemented. The planning process for a work order used to implement a TA is the same as that used for a permanent plant modification.

The licensee intends to use the following two established processes to ensure that the operations staff is aware of the changes being made to the circuit for the inoperable ARPI:

(1) Issuance of a Standing Order - Standing Orders are used to convey information to management, limitations of access to certain areas and equipment, and other similar long-term or policy matters.

(2) Shift Turnover Checklist - The oncoming operators must review the documents specified on their checklists before assuming responsibility for their shift position. The individual being relieved is responsible for passing on all pertinent information concerning work under his jurisdiction to the operator coming on-shift.

Based on the information provided in the July 11, 2005, submittal, the NRC staff concludes that the TA will be implemented properly and, therefore, the staff finds this process acceptable.

The proposed method will monitor the rod control system parameters for indications of rod movement for the rod with the inoperable position indicator through installation of a resistor pack that will be treated as a TA. The rod control system parameters monitored are the operation and timing of the lift coil and the stationary gripper coil. No change in the current output would indicate that the rod has not moved. The digital recorder output located on a control board in the MCR, adjacent to the control board where the displays for the ARPIs are located, will continue to display the step number of the rod location for the inoperable ARPI. In a letter dated August 19, 2004, TVA defined intentional and unintentional movement of the rod with the inoperable ARPI. TS 3.1.8 Action A.2.3 requires rod position verification using movable incore detectors any time the reactor coolant system parameters detect unintentional movement, and when the rod with the inoperable ARPI is intentionally moved greater than 12 steps. The limits on shutdown or control rod alignments of 12 steps or more ensure that the assumptions in the safety analyses will remain valid and that the assumed negative reactivity will be available to be inserted during a unit shutdown. Should there be a full-rod drop of a control or shutdown rod, it will be immediately detectable by means other than the position indication system. Independent indication of a dropped rod is obtained using the excore power range signals. Additionally, a negative reactivity insertion corresponding to the reactivity worth of a full-rod drop will cause a change in core parameters including core average temperature and axial flux. Rod misalignment will also be detectable by other means, such as axial flux deviations or a channel deviation alarm. Therefore, the likelihood of an undetected rod drop or misalignment is considered negligible while using the alternate monitoring method.

The proposed method will provide indication of the rod position as last determined using the movable incore detectors, as well as the ability for a unit operator to continuously monitor the position of the affected rod via a digital recorder. In response to an NRC staff's concern regarding the actual position of a rod with an inoperable ARPI when the alternate method is used, the licensee proposes to implement a software algorithm that will set off different alarms when the rod does not move as demanded, or when it moves unintentionally. In its letter dated July 11, 2005, TVA described the different scenarios that will generate a plant computer alarm, via the installed software algorithm, when the alternate method is used to ensure that the position of the rod is known. An alarm requiring operator action will be generated if the rod stepped in the wrong direction, if the rod stepped with no demand (whether in automatic or manual control), if the alternate monitoring circuit fails, or if the affected rod is operating outside of the rod-to-rod or the rod-to-bank deviation limits.

As a means to verify the operation of the software algorithm, the licensee tested the software using signal data obtained from control rod drive mechanism (CRDM) timing tests. The following functions are supported by the software algorithm:

1. Numerical Display of Rod Position: The software in the integrated computer system (ICS) will maintain the position for the affected ARPI by counting successful IN or OUT steps taken by the rod. The position of the rod is displayed in the number of steps the rod is removed from fully inserted and is available on the ICS. The ICS provides an output signal to a digital recorder on a control board adjacent to the ARPI displays.

2. Rod-to-Rod Deviation Alarm: The software will compare the ARPI it is monitoring to the other ARPIs in the bank and generate a rod-to-rod deviation alarm if a difference of more than 12 steps exists.

3. Rod-to-Bank Deviation Alarm: The software will compare the ARPI it is monitoring to the associated bank demand and generate a rod-to-bank deviation alarm if a difference of more than 12 steps exists.

4. Monitoring of Rod Position: The software will analyze the CRDM coil currents to determine if an inward or outward step was demanded and taken and decrement or increment the associated counter accordingly.

5. Rod movement - intentional or unintentional: Intentional rod movement occurs when either a unit operator manually demands motion from the rod control system, or a temperature or power mismatch demands motion while the rod control system is being controlled automatically.

6. Alarm and monitoring capabilities of the proposed alternate plan: The ICS provides an output signal representative of rod position in steps to a digital recorder that is adjacent to the ARPI displays. The alarm functions include (1) the rod stepped in the wrong direction, (2) the rod stepped with no demand, and (3) the alternate monitoring circuit failed. The function of the recorder and the deviation monitor are available to indicate or alarm for intended or unintended rod movements.

Based on the above discussion, the staff finds that the plant computer has provided necessary information for operators to understand the status of the ARPI system, and has sufficient information to perform required operating procedures.

TVA also addressed escalation in thermal power above 50 percent RTP, should there be any reduction in power followed by a return to full RTP. The TS required action for the one rod with the inoperable ARPI states that prior to increasing thermal power above 50 percent RTP, and within 8 hours of reaching 100-percent RTP, the position of the rod with an inoperable position indicator should be verified using the movable incore detectors.

In response to an NRC staff request for additional information on whether the rod with the inoperable ARPI will be counted against SDM, TVA responded that a rod with no rod bottom indication will be treated as untrippable. Rod bottom indication will not be available for the rod with the failed ARPI. Currently, WBN has procedures in place that address the condition in which more than one rod may not indicate fully inserted on a reactor trip to ensure that the

reactor is safely shut down. Therefore, when a rod has an inoperable ARPI, it is treated as if it has not fully inserted on a reactor trip and operators will take actions as currently driven by procedures to safely shut down the reactor. At WBN, SDM calculations are performed in accordance with Surveillance Instruction 1-SI-0-10. Emergency Operating Procedures already in place are relied upon to address the SDM requirements following a unit trip. Therefore, the NRC staff concludes that there are adequate controls to provide reasonable assurance that the plant will continue to achieve subcriticality on a reactor trip.

In its letter dated August 19, 2004, TVA committed to revising section 7.7.1.3.2, "Main Control Room Rod Position Indication," of the UFSAR. The proposed revision will discuss the rod control system monitoring process and will clarify that while the alternate monitoring process is in use, the operation of the system will be periodically verified through implementation of Surveillance Requirement (SR) 3.1.5.2, SR 3.2.1.1, and SR 3.2.2.1. If a second ARPI should fail, the licensee will have to invoke LCO 3.1.8 Action A.1 and perform a flux map using movable incore detectors every 8 hours, or shut down the unit and perform the needed repairs.

The NRC staff has reviewed all of the material submitted and concludes that the proposed TS changes provide adequate controls to ensure that the rod position is known, that any rod misalignment is detectable for the one rod with an inoperable ARPI, and that operators will take appropriate action to ensure the rod stays within its alignment limit and SDM is maintained. Additionally, the staff agrees that the inoperable ARPI should be repaired at the end of the cycle or during an entry into Mode 5 of sufficient duration, when the repair can be safely performed as stated in proposed TS 3.1.8.

The NRC staff has evaluated the licensee's request to amend the WBN TSs to have an alternate method to monitor the rod position for a rod with an inoperable ARPI until the end of the operating cycle. Based on the staff's review of the application dated November 21, 2003, as supplemented by letters dated May 5, and August 19, 2004, and July 11, 2005, the staff reaches the following conclusions:

- The WBN proposed TS change for monitoring a failed ARPI is similar to those of Turkey Point Nuclear Plant, Unit 4, and Robinson Nuclear Plant, Unit 2, which the NRC staff approved on August 20, 2002, and February 13, 2003, respectively.

- The "Temporary Alteration" process described in the submittal provides assurance that the operations staff has a clear understanding of the status of the failed ARPI, and has sufficient information to perform required operating procedures.

- The WBN TS change continues to meet GDC 13 since the amendment provides an acceptable process for knowing the position of the rod with the inoperable ARPI. WBN also continues to meet GDC 26 since it will continue to have two independent reactivity control systems and the procedures are already in place to maintain the reactor core subcritical under cold conditions.

For these reasons, the NRC staff finds the proposed changes acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (68 FR 74267). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: M. Barillas
H. Li

Dated: September 20, 2005