**Tennessee Valley Authority**, Post Office Box 2000, Spring City, Tennessee 37381-2000

January 27, 2011 10 CFR 50.36

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

**Subject: Watts Bar Nuclear Plant (WBN) - Unit 2 - Change to Developmental Technical Specification (TS) Section 3.1.8, "Rod Position Indication"**

Reference: TVA letter to NRC dated October 12, 2010, "Watts Bar Nuclear Plant (WBN) - Unit 2 - Change to Developmental Technical Specification (TS) Sections 3.6.11, 'Ice Bed,' and 3.1.8, 'Rod Position Indication'"

This letter transmits changes to WBN Unit 2 Developmental TS Section 3.1.8, "Rod Position Indication," resulting from discussions with the staff on October 26, 2010. The enclosure proposes the removal of the previously inserted word "indirectly," from TS 3.1.8 action statements regarding verification of the position of the control rods using Power Distribution Monitoring System (PDMS). The word "indirectly" had been inserted via the above reference letter. Rather than inserting the word "indirectly" in the action statements, it was agreed via discussions mentioned above to insert additional verbiage in TS Bases Section TS 3.1.8 to describe the method used to determine rod position using PDMS. In addition, the word "inferred" was replaced with "determined" within the Action Statement A.1 discussion within TS Bases Section 3.1.8. TVA believes that the changes to TS 3.1.8 identified in the reference above coupled with the subsequent minor changes discussed in this letter address the difference that the Unit 2 configuration presents.

TVA has submitted WBN Unit 2 TS Developmental Revisions A, B, C, and D via letters dated March 4, 2009; February 2, 2010; August 16, 2010; and October 12, 2010, respectively. Changes to the TS in this letter are reflected as Developmental Revision E.

There are no new commitments associated with this submittal. If you have any questions, please contact William Crouch at (423) 365-2004.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 27th day of January 2011.

Respectfully,

M. Bajestani

Masoud Bajestani
Watts Bar Unit 2 Vice President

Enclosure: Description of Change to Developmental TS Section 3.1.8, "Rod Position Indication"

Attachments to Enclosure:

1. Mark-up of Developmental WBN Unit 2 TS Section 3.1.8, "Rod Position Indication," to Create Revision E

2. Retyped Version of WBN Unit 2 TS Section 3.1.8, "Rod Position Indication," Developmental Revision E

3. Mark-up of Developmental WBN Unit 2 TS Bases Section 3.1.8, "Rod Position Indication," to Create Revision E

cc (Enclosure):

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**Enclosure**

**Description of Change to**
**Developmental Technical Specification (TS)**
**Section 3.1.8, "Rod Position Indication"**

## Background

The NRC approved a change via Amendment 82 to the Unit 1 TS (Reference), to be able to verify the position of a control rod with an inoperable Rod Position Indication (RPI) with either the Movable Incore Detector System (MIDS) or with the Power Distribution Monitoring System (PDMS).

There is a fundamental difference; however, between WBN Unit 1 and Unit 2. Unit 1 has the MIDS and Unit 2 will have the Westinghouse In-Core Information Surveillance and Engineering (WINCISE) system. The MIDS collects 61 axial points from top to bottom of the core, each point representing about 2.4 inches each or 3.8 control rod steps. WINCISE has fixed incore detectors with only 5 axial nodes of about 28.8 inches each or 46 control rod steps. These large axial nodes prevent the use of raw detector data to be used to "directly" verify the position of the rod on Unit 2.

The indirect PDMS method would be used to verify the position of a control rod with an inoperable RPI on Unit 2. The PDMS develops a detailed three-dimensional power distribution via its nodal code coupled with updates from plant instrumentation. The monitored power distribution, which includes radial adjustments from the core exit thermocouples, can be compared to the reference power distribution expected with all control rods properly aligned. In this way, agreement between the two power distributions can be used to indirectly verify that the control rod with the inoperable RPI is aligned.

By letter dated October 12, 2010, TVA proposed, in part, to insert the word "indirectly" into TS 3.1.8, Action Statements, A.1, A.2.1, A.2.3, and B.1. After a discussion with the staff on October 26, 2010, it was agreed to remove the word "indirectly" from the action statements and to insert new verbiage into the bases section of TS 3.1.8 which describes the method used to determine rod position using PDMS.

## Description of Change

1. Remove the word "indirectly" from TS 3.1.8, Action Statements, A.1, A.2.1, A.2.3, and B.1.

2. Insert the following text as the last paragraph of the background section for TS Bases Section, 3.1.8:

   "The Power Distribution Monitoring System (PDMS) as controlled by Technical Requirements Manual Section 3.3.3 develops a detailed three dimensional power distribution via its nodal code coupled with updates from plant instrumentation, including the fixed incore detectors. The monitored power distribution is compared to the reference power distribution corresponding to all control rods properly aligned. Agreement between the two power distributions can be used to indirectly verify the control rod is aligned."

3. Replace the word "inferred" with the word "determined" in first paragraph of the TS Bases Action Statement A.1 discussion.

**Enclosure**

**Description of Change to**
**Developmental Technical Specification (TS)**
**Section 3.1.8, "Rod Position Indication"**

Attachments 1 and 2 contain the mark-up and the retyped version of the appropriate TS pages. Attachment 3 contains the mark-up of the appropriate TS Bases pages for information only.

Reference:

1. NRC to TVA, "Watts Bar Nuclear Plant, Unit 1 - Issuance of Amendment Regarding the Application to Implement Beacon Core Power Distribution and Monitoring System (TAC No. ME1698)," dated October 27, 2009 [ML092710381]

# Attachment 1 to Enclosure

Mark-up of

Developmental WBN Unit 2 TS

Section 3.1.8, Rod Position Indication

to Create Revision E

Technical Specification Pages

3.1-15
3.1-16

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 Rod Position Indication

LCO 3.1.8 The Rod Position Indication (RPI) System and the Demand Position Indication System shall be OPERABLE.

APPLICABILITY: MODES 1 and 2

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each inoperable rod position indicator per group and each demand position indicator per bank.
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| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| ----------NOTE----------<br>Rod position monitoring by Required Actions A.2.1 and A.2.2 may only be applied to one inoperable RPI 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 RPI 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 RPI could have safely been performed.<br>----------<br>A. One RPI per group inoperable for one or more groups. | A.1 Verify the position of the rods with inoperable position indicators ~~indirectly~~ by using the PDMS.<br><br>OR<br><br>A.2.1 Verify the position of the rod with the inoperable position indicator ~~indirectly~~ by using the PDMS.<br><br>AND | Once per 8 hours<br><br>8 hours<br><br>AND<br><br>Once every 31 days thereafter<br><br>AND<br><br>8 hours, if rod control system parameters indicate unintended movement |

(continued)

ACTIONS

| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| A. (continued) | 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.<br><br>AND<br><br>A.2.3 Verify the position of the rod with an inoperable position indicator ~~indirectly~~ by using the PDMS.<br><br>OR<br><br>A.3 Reduce THERMAL POWER to less than or equal to 50% RTP. | 16 hours<br><br>AND<br><br>Once per 8 hours thereafter<br><br>8 hours, if the rod with an inoperable position indicator is moved greater than 12 steps.<br><br>AND<br><br>Prior to increasing THERMAL POWER above 50% RTP and within 8 hours of reaching 100% RTP<br><br>8 hours |
| B. One or more rods with inoperable position indicators have been moved in excess of 24 steps in one direction since the last determination of the rod's position. | B.1 Verify the position of the rods with inoperable position indicators ~~indirectly~~ by using the PDMS.<br><br>OR<br><br>B.2 Reduce THERMAL POWER to less than or equal to 50% RTP. | 4 hours<br><br>8 hours |

(continued)

# Attachment 2 to Enclosure

Retyped Version of

Developmental Revision E WBN Unit 2 TS

Section 3.1.8, Rod Position Indication

Technical Specification Pages

3.1-15
3.1-16

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 Rod Position Indication

LCO 3.1.8 The Rod Position Indication (RPI) System and the Demand Position Indication System shall be OPERABLE.

APPLICABILITY: MODES 1 and 2

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each inoperable rod position indicator per group and each demand position indicator per bank.
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| CONDITION | REQUIRED ACTION | COMPLETION TIME |
|---|---|---|
| ----------NOTE----------<br>Rod position monitoring by Required Actions A.2.1 and A.2.2 may only be applied to one inoperable RPI 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 RPI 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 RPI could have safely been performed.<br>----------<br>A. One RPI per group inoperable for one or more groups. | A.1 Verify the position of the rods with inoperable position indicators by using the PDMS.<br><br>OR<br><br>A.2.1 Verify the position of the rod with the inoperable position indicator by using the PDMS.<br><br>AND | Once per 8 hours<br><br>8 hours<br><br>AND<br><br>Once every 31 days thereafter<br><br>AND<br><br>8 hours, if rod control system parameters indicate unintended movement |

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ACTIONS

| CONDITION | REQUIRED ACTION | | COMPLETION TIME |
|---|---|---|---|
| A. (continued) | 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. | 16 hours<br><br>AND<br><br>Once per 8 hours thereafter |
| | AND | | |
| | A.2.3 | Verify the position of the rod with an inoperable position indicator by using the PDMS. | 8 hours, if the rod with an inoperable position indicator is moved greater than 12 steps.<br><br>AND<br><br>Prior to increasing THERMAL POWER above 50% RTP and within 8 hours of reaching 100% RTP |
| | OR | | |
| | A.3 | Reduce THERMAL POWER to less than or equal to 50% RTP. | 8 hours |
| B. One or more rods with inoperable position indicators have been moved in excess of 24 steps in one direction since the last determination of the rod's position. | B.1 | Verify the position of the rods with inoperable position indicators by using the PDMS. | 4 hours |
| | OR | | |
| | B.2 | Reduce THERMAL POWER to less than or equal to 50% RTP. | 8 hours |

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# Attachment 3 to Enclosure

Mark-up of

Developmental WBN Unit 2 TS Bases

Section 3.1.8, Rod Position Indication

to Create Revision E

Technical Specification Bases Pages

B 3.1-48
B 3.1-50

BASES

BACKGROUND (continued)

The axial position of shutdown rods and control rods are determined by two separate and independent systems: the Bank Demand Position Indication System (commonly called group step counters) and the Rod Position Indication (RPI) System.

The Bank Demand Position Indication System counts the pulses from the Rod Control System that move the rods. There is one step counter for each group of rods. Individual rods in a group all receive the same signal to move and should, therefore, all be at the same position indicated by the group step counter for that group. The Bank Demand Position Indication System is considered highly precise (± 1 step or ± 5/8 inch). If a rod does not move one step for each demand pulse, the step counter will still count the pulse and incorrectly reflect the position of the rod.

The RPI System provides an accurate indication of actual control rod position, but at a lower precision than the step counters. 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 RPI System is ± 6 steps (± 3.75 inches), and the maximum uncertainty is ± 12 steps (± 7.5 inches). With an indicated deviation of 12 steps between the group step counter and RPI, the maximum deviation between actual rod position and the demand position could be 24 steps, or 15 inches.

**The Power Distribution Monitoring System (PDMS) as controlled by Technical Requirements Manual Section 3.3.3 develops a detailed three dimensional power distribution via its nodal code coupled with updates from plant instrumentation, including the fixed incore detectors. The monitored power distribution is compared to the reference power distribution corresponding to all control rods properly aligned. Agreement between the two power distributions can be used to indirectly verify the control rod is aligned.**

APPLICABLE SAFETY ANALYSES

Control and shutdown rod position accuracy is essential during power operation. Power peaking, ejected rod worth, or SDM limits may be violated in the event of a Design Basis Accident (Ref. 2 through 12), with control or shutdown rods operating outside their limits undetected. Therefore, the acceptance criteria for rod position indication is that rod positions must be known with sufficient accuracy in order to verify the core is operating within the group sequence, overlap, design peaking limits, ejected rod worth, and with minimum SDM (LCO 3.1.6, "Shutdown Bank Insertion Limits," and LCO 3.1.7, "Control Bank Insertion Limits"). The rod positions must also be known in order to verify the alignment

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BASES (continued)

because these are the only MODES in which power is generated, and the OPERABILITY and alignment of rods have the potential to affect the safety of the plant. In the shutdown MODES, the OPERABILITY of the shutdown and control banks has the potential to affect the required SDM, but this effect can be compensated for by an increase in the boron concentration of the Reactor Coolant System.

ACTIONS

The ACTIONS table is modified by a Note indicating that a separate Condition entry is allowed for each inoperable rod position indicator per group and each demand position indicator per bank. This is acceptable because the Required Actions for each Condition provide appropriate compensatory actions for each inoperable position indicator.

A.1

When one RPI channel per group fails, the position of the rod can still be ~~inferred~~ **determined** indirectly by use of incore power distribution measurement information. Incore power distribution measurement information is obtained from an OPERABLE Power Distribution Monitoring System (PDMS) (Ref. 15). Based on experience, normal power operation does not require excessive movement of banks. If a bank has been significantly moved, the Required Action of B.1 or B.2 below is required. Therefore, verification of rod position within the Completion Time of 8 hours is adequate for allowing continued full power operation, since the probability of simultaneously having a rod significantly out of position and an event sensitive to that rod position is small.

A.2.1, A.2.2

The control rod drive mechanism (a portion of the rod control system) consists of four separate subassemblies; 1) the pressure vessel, 2) the coil stack assembly, 3) the latch assembly, and 4) the drive rod assembly. The coil stack assembly contains three operating coils; 1) the stationary gripper coil, 2) the moveable gripper coil, and 3) the lift coil. In support of Actions A.2.1 and A.2.2, a Temporary Alteration (TA) to the configuration of the plant is implemented to provide instrumentation for the monitoring of the rod control system parameters in the Main Control Room. The TA creates a circuit that monitors the operation and timing of the lift coil and the stationary gripper coil. Additional details regarding the TA are provided in the FSAR (Ref. 14).

Required Actions A.2.1 and A.1 are essentially the same. Therefore, the discussion provided above for Required Action A.1 applies to Required Action A.2.1. The options provided by Required Actions A.2.1 and A.2.2 allow for continued operation in a situation where the component causing

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