TVA

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

JUL 11 2005

WBN-TS-03-12

10 CFR 50.90

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

Gentlemen:

In the Matter of the	)	Docket No. 50-390
Tennessee Valley Authority	)	

WATTS BAR NUCLEAR PLANT (WBN) – LICENSE AMENDMENT (WBN-TS-03-12) MONITORING OF CONTROL OR SHUTDOWN ROD POSITION BY AN ALTERNATE MEANS - REQUEST FOR ADDITIONAL INFORMATION (RAI) (TAC MC 1419)

Pursuant to 10 CFR 50.90, TVA submitted a request for an Operating License change (WBN-TS-03-12) to license NPF-90 for WBN Unit 1 on November 21, 2003. The proposed amendment revises Technical Specification (TS) 3.1.8, "Rod Position Indication (RPI)," to allow the position of the control and shutdown rods to be monitored by a means other than the moveable incore detectors.

TVA held a teleconference with NRC on April 8, 2005, to discuss the proposed amendment. TVA's response to NRC's remaining questions is provided in Enclosure 1. Further, in that conversation TVA agreed to limit the changes proposed to TS 3.1.8 and the Bases to:

A001

1. Clarify that the alternate process may only be applied to one inoperable ARPI, and

2. Reflect in the Bases the Rod Control System parameters that will be monitored by the alternate process.

An updated version of the annotated TS and Bases that address NRC's comments is provided in Enclosure 2. TVA considers that the information provided in the enclosures clarifies the proposed amendment and does not change the initial proposed no significant hazards consideration determination.

This letter contains no regulatory commitments. Should there be questions regarding this letter, please contact me at (423) 365-1824.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 11th day of July, 2005.

Sincerely,

P. L. Pace
Manager, Site Licensing
and Industry Affairs

Enclosures:

1. TVA's Response to Remaining NRC Questions
2. Updated Annotated Technical Specifications

cc: See page 3

JUL 1 1 2005

PLP:
Enclosures
cc (Enclosures):

NRC Resident Inspector
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

Mr. D. V. Pickett, Project Manager
U.S. Nuclear Regulatory Commission
MS O8G9a
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2738

U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1
DOCKET NUMBER 390

PROPOSED LICENSE AMENDMENT REQUEST WBN-TS-03-12

RESPONSE TO NRC'S REQUEST FOR ADDITIONAL INFORMATION (RAI)

TVA held a teleconference with NRC on April 8, 2005, and June 3, 2005, to discuss the proposed amendment. TVA's responses to NRC's remaining questions are provided below:

NRC Question 1:

The licensee proposed to determine the rod position within eight hours for unintended rod movement only of an inoperable Analog Rod Position Indicator (ARPI). Shutdown rods are not expected to move throughout the cycle without operator action. Therefore, any rod movement would require the operator to determine its position. In the case of control rods, the rods may move intentionally due to operator demand on the Rod Control System or temperature mismatch when in automatic control, or unintentionally due to loss of current to gripper coils, or rod motion in a direction not demanded by the Rod Control System. Monitoring the gripper coil voltage would not identify a mechanically stuck rod. The proposed alternate method, as described in the August 19, 2004 RAI Response submittal, monitors the rod movement demanded by the Rod Control System, not the actual rod position for the control rods. Under the proposed alternate method, the rod-to-rod deviation alarm and the rod-to-bank deviation alarm that are available receive input from the resistor pack (demanded position) that will be installed, instead of the ARPI system (actual position). The licensee may become unaware of a misaligned rod for an extended period of time for intended rod movement. If the rod is moved with no ARPI available to indicate the actual rod position, there ought to be some verification that the rod moved as demanded, whether intended or unintended. The staff's concern is that the requirement should be tied to actual moved rod position, not intent.

TVA's Response to Question 1:

The TS Bases for LCO 3.1.5 clarifies that maximum rod misalignment (greater than 12 steps) is an initial assumption in the safety analysis that directly affects core power distributions and assumptions of available SDM. However, it important to understand that during an operational cycle, rod movement is generally within the limits of the deviation monitor (12 steps) unless the unit experiences a transient. For general reactivity adjustments, the only rod group that is moved is Control Bank D. The other Control Banks or all of the Shutdown Banks are routinely not moved and for these banks, the monitoring and alarm functions provided by the alternate means are fully adequate to ensure that the position/status of the rod with the inoperable ARPI is known.

As an added measure to ensure the position of the affected rod is known, TVA has revised proposed Action A.2.3. Initially this action was proposed to control the steps that will be taken to return the unit to power operation with the alternate monitoring process in place following an entry into Mode 3. The proposed changes ensure the position of the rod with the inoperable ARPI is verified by use of the incore detectors whenever rod movement in one direction of greater than 12 steps has the potential to affect rod group alignment. The proposed wording for Action A.2.3 is shown below:

A. (continued)	*A.2.3*	***Verify the position of the rod with an inoperable position indicator by using movable incore detectors.***	***8 hours, if the rod with an inoperable position indicator is moved greater than 12 steps.*** ***<u>AND</u>*** ***Prior to increasing THERMAL POWER above 50% RTP and within 8 hours of reaching 100% RTP***

<u>NRC Question 2:</u>

To perform S.R. 3.1.5.1, "Rod Group Alignment Limits", the position of the rod banks are read from the Computer Enhanced Rod Position Indication (CERPI) system which obtains its information from the ARPI system. For a rod with an inoperable ARPI, the position of the rod is assumed from the alternate proposed method, which does not provide the same assurance of rod position as the ARPI or the incore flux map. An unknown rod position may affect the power peaking in the core. This in effect, may reduce the total rod worth available for a safe reactor shutdown in a design basis accident. The staff's concern is the proposed alternate method results in a reduction in safety margin since the assumed initial conditions of the accident analyses may no longer be preserved. The staff is also concerned how the licensee will assure shutdown margin and other Chapter 15 requirements are met under this condition.

The licensee proposed to have only two inoperable ARPIs at the same time. Currently, the plant is analyzed for one rod of the highest worth stuck out. The staff requests the licensee provide the calculations and analytical results which show the plant will meet shutdown margin and be brought down to a safe shutdown condition with two inoperable ARPIs (whether two control rods, two shutdown rods, or one control and one shutdown rod) misplaced in the core. The number of ARPI(s) that can be inoperable should be based on the ability to meet the shutdown margin (SDM). Rod Bottom Indication will not be available for the rod with the failed ARPI. The licensee can no longer verify the rod position for the inoperable ARPI(s) after a reactor trip, which places the plant in an unanalyzed condition. For every ARPI that is inoperable, the licensee should assume the affected rod is not capable of providing negative reactivity following a reactor trip and the licensee should count that ARPI against the SDM to ensure SDM can still be met.

TVA's Response to Question 2:

SDM calculations performed in accordance with Surveillance Instruction (SI) 1-SI-0-10, "Shutdown Margin," account for the rod of most worth being stuck in the full out position. Emergency Operating Instructions are then relied upon to address the SDM requirements following a unit trip. The following information clarifies the actions of the two principal instructions that address a unit trip and how stuck rods and/or SDM are addressed. Also provided below is a discussion on the boration sources available and the Technical Specification (TS) required actions:

E-0, "Reactor Trip or Safety Injection"

This instruction contains the Operator actions that are taken to respond to a reactor trip which requires operation of the Safety Injection (SI) System. The SI System is one of the key three systems that constitute the Emergency Core Cooling System (ECCS). The ECCS initially feeds borated water to the RCS from the Refueling Water Storage Tank (RWST).

Step 1 of E-0 verifies the reactor is shutdown. If it is determined that the reactor did not trip (reactor trip breakers will not open or no rod bottom indication), the operator is instructed to initiate instruction FR-S.1, "Nuclear Power Generation/ATWS." Step 20 of FR-S.1 instructs the operator to perform a SDM calculation in accordance with 1-SI-0-10. The SDM calculation takes into account the number of stuck or untrippable rods and adjusts the boron concentration to compensate for the loss of negative reactivity. Further, Step 22 of E-0 initiates the termination of the operation of the SI System in accordance with Emergency Operating Instruction ES-1.1, "SI Termination." Step 36 of ES-1.1 initiates the implementation of Appendix C, "Surveillances and Reports," of ES-1.1. Step 1.c of the appendix initiates the performance of an SDM calculation in accordance with 1-SI-0-10.

ES-0.1, "Reactor Trip Response"

For a reactor trip where operation of the SI System is not required, the operator's response is controlled by Emergency Operating Instruction ES-0.1. Step 5 of this instruction verifies that all rods have fully inserted and if two or more rods are not indicating fully inserted, action is taken to initiate the addition of boron which has a concentration of at least 6120 ppm. During this action, 3250 gallons of the 6120 ppm concentration is added for each rod that has not fully inserted. The 6120 ppm is available through the Chemical Volume Control System (CVCS) from the Boric Acid Tanks (BATs).

The following statement is made as part of NRC's Question 2:

> "...The number of ARPI(s) that can be inoperable should be based on the ability to meet the shutdown margin (SDM). Rod Bottom Indication will not be available for the rod with the failed ARPI. The licensee can no longer verify the rod position for the inoperable ARPI(s) after a reactor trip, which places the plant in an unanalyzed condition..."

The second sentence of the above statement is correct in that the rod bottom light will not function for the rod with an inoperable ARPI. The first sentence implies that the number of inoperable ARPIs must be based on the ability to meet SDM requirements. Action A of the current approved version of LCO 3.1.8 allows one ARPI per group to be inoperable. WBN's current Action A of LCO 3.1.8 is consistent with LCO 3.1.7, "Rod Position Indication," of Revision 3 of NUREG 1431, "Standard Technical Specifications Westinghouse Plants."

It is important to remember that the Rod Cluster Control Assemblies are divided into four control banks and four shutdown banks. Six of the banks are divided into two groups (12 groups total). Shutdown banks C and D have only one group each. This results in there being 14 groups total for all banks. Although TVA management will not permit operation in this condition, the current Action A of LCO 3.1.8 will allow WBN to operate with up to 14 ARPIs inoperable at the same time. This means that if, a unit trip occurs during the period the 14 ARPIs were inoperable, the operator will not receive the rod bottom lights for 14 rods. The current mechanism available to the operator to address an event such as this is the Emergency Operating Instructions. Accordingly, operating in this manner is not "an unanalyzed condition." The use of the Emergency Operating Instructions for this function is not unique to WBN and the validity of WBN's instructions was confirmed prior to receipt of an operating license for Unit 1.

<u>NRC Question 3:</u>

Describe how the alternate monitoring process will be implemented. Include in this discussion, details on the work control processes that will be followed during the installation and use of the temporary equipment.

<u>TVA Response to Question 3:</u>

TVA currently plans to implement the changes to the ARPI circuit to install the alternate monitoring equipment as a Temporary Alteration (TA) in accordance with TVA Standard Programs and Processes (SPP) 9.5, "Temporary Alterations." Section 3.3, "Temporary Alteration Control Form (TACF) Initiation and Evaluation," of the SPP governs the type of TA that will be developed to support the alternate monitoring. Permanent plant modifications are implemented in accordance with SPP-9.3, "Plant Modifications and Design Change Control."

The process defined in SPP-9.5 for the type of TA that will be implemented is broken into eight parts: 1) Initiation, 2) Evaluation, 3) Recommendation and Approval, 4) Installation, 5) Revision of Affected Drawings, Procedures, Instructions and Documents, 6) Return to Normal, 7) Re-instatement of Affected Drawings, Procedures, Instructions, and Documents, and 8) Closure.

During the Evaluation phase, the same effort goes into the TA that goes into a permanent plant design change. A 10 CFR 50.59 screening review is performed and a complete 10 CFR 50.59 evaluation is performed when required. A Technical Evaluation is also performed using the guidelines contained in SPP-9.3. Part of this will include a design review of the TA. This process is defined in SPP-9.3 and will involve all organizations responsible for site documents impacted by the TA. This will ensure that the impacted documents are identified and updated to properly implement the TA. Following this portion of the process, plant management reviews the package and either approves it or recommends cancellation or revision. The approval process includes the review and approval by the Plant Operations Review Committee (PORC). The PORC is a multidisciplined committee responsible for providing an oversight review of documents required for the safe operation of the plant. The PORC advises the Plant Manager on matters related to nuclear safety.

Upon approval by PORC and plant management, the TA will be implemented by a Work Order (WO). The initiation and implementation of a WO is controlled by SPP-7.1, "On Line Work Management." The planning process for a WO used to implement a TA is the same as that used for a permanent plant modification. If the work is identified as critical (trip sensitive), the WO is screened by plant management to ensure the appropriate precautions are placed in the WO. Once the TA is installed, the modification is tested as part of the WO to ensure it functions properly. The removal of the TA and the return of the circuit to its original configuration also requires testing to verify the affected equipment is performing properly. This testing is also performed as an element of the WO process. Further, the removal of the TA from the circuit will require a review to ensure the documents revised as a result of the TA are returned to the original plant configuration.

The preceding discussion was a general overview of WBN's work control process. The following discussion is provided to detail the work control process. TVA considers this process to be very robust since both the TA and the implementing WO pass through numerous reviews and approvals prior to implementation: Also provided below is a discussion on the testing of the software algorithm.

<u>Work Planning and Control of Risk:</u>

In addition to SPP-7.1, Technical Instruction (TI) 124, "Equipment to Plant Risk Matrix," controls WBN's work control risk evaluation processes. SPP-7.1 specifies the general responsibilities and standard programmatic controls for the work control process during plant operation. This procedure applies to all work activities that affect or have the potential to affect a plant component, system, or unit configuration. Work performed during a planned or forced outage is controlled by SPP-7.2, "Outage Management."

WBN's long-term maintenance plan is a product of the preventive and surveillance process and specifies the frequency for implementation of maintenance and surveillance activities necessary for the reliability of critical components in each system. An established 12-week rolling schedule includes the preliminary defense-in-depth assessment, which documents the allowable combinations of system and functional equipment groups (FEGs) that may be simultaneously worked online or during shutdown conditions. FEGs are sets of equipment that have been evaluated for acceptable out-of-service combinations. They are used to schedule planned maintenance and establish equipment clearances.

Predetermined FEG work windows are established for online maintenance and outage periods. The work windows are based on recommended maintenance frequencies and sequenced to minimize the risk of online maintenance. Work windows are defined by week and repeat at 12-week intervals. The work windows ensure required surveillances are performed within their required frequency and that division/train/loop/channel interferences are minimized. The WBN Scheduling organization maintains a long range schedule based on required surveillance testing of online activities and plant conditions.

The surveillance testing schedule provides the "backbone" for the long-term maintenance plan. Other periodic activities (preventive maintenance items) are scheduled with related surveillance tests to maximize component availability. FEGs are used to ensure work on related components is evaluated for inclusion in the work window. Related corrective maintenance (CM) activities are also evaluated for inclusion in the work window provided by surveillance and preventive maintenance performance. The inclusion of identified work in the FEG work window with the surveillance tests and preventive maintenance items maximizes component availability and operability.

The TI-124 risk assessment methodology is used for online maintenance activities. For online maintenance a risk assessment is performed prior to work window implementation and emergent work is evaluated against the assessed scope.

The TI-124 risk assessment guidelines utilize the results of the WBN Probabilistic Safety Analysis (PSA). Other safety considerations, such as Technical Specifications, are also used to determine which system, component, and FEG combinations may be worked online. In addition, an assessment of scheduled activities is performed before implementation of a work window. The assessment includes reviews for the following:

- The schedule is evaluated against the risk bases outlined in the WBN PSA.
- Maximizing safety (reduce risk) when performing online work.
- Avoidance of recurrent entry into a specific limiting condition for operation (LCO) for multiple activities. Activities that require entering the same LCO are combined to limit the number of times an LCO must be established, thus maximizing the equipment's availability.
- If the risk associated with a particular activity cannot be determined, Nuclear Engineering is requested to perform a risk assessment.

Testing of the Software Algorithm:

As a means to verify that the operation of the software algorithm, TVA tested the software using signal data obtained from Control Rod Drive Mechanism (CRDM) timing tests. Further, TVA considers the 31 day verification of the position of the affected rod by use of the incore detectors to be an appropriate measure to confirm the functionality of the circuit (refer to the responses to Question 1 above). This, along with the computer alarm that will be generated if the circuit fails, provides adequate assurance that the circuit is operating properly. In addition, SR 3.1.5.2 is performed every 92 days to verify the rods move freely. This test will be used to establish the monitoring circuit is operating as designed. TVA intends to clarify in WBN's licensing basis the capabilities provided by the alternate monitoring process. This will be accomplished through a revision to Section 7.7.1.3.2, "Main Control Room Rod Position Indication," of the Updated Final Safety Analysis Report (UFSAR). The proposed revision will discuss the rod control system monitoring process and will clarify that while the alternate monitoring is in use, the operation of the system will be periodically verified through the implementation of SR 3.1.5.2, SR 3.2.1.1 and SR 3.2.2.1.

NRC Question 4:

Provide a detailed description of the functions provided by the software algorithm used to support the alternate monitoring process.

TVA Response to Question 4:

Listed below are the key functions 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 (e.g. 0-250 steps) and is available on the ICS. In addition, the ICS provides an output signal representative of rod position in steps to a digital recorder located on a control board (1-M-5) in the Main Control Room (MCR). This MCR board is adjacent to the control board (1-M-4) where the displays for the ARPIs are located.

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. The alarm will be displayed in the same alarm window (83-D) as that used for the normal rod-to-rod deviation algorithm. Refer to TVA's response to Question 1.c provided in Enclosure 1 for additional information.

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. As with the rod-to-rod deviation alarm, the alarm will be displayed in alarm window (83-D).

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 a counter accordingly. Provided below is additional information regarding the monitoring functions provided by the alternate monitoring process:

Rod movement - intentional and unintentional:

The control rod banks may be automatically controlled from input signals generated by the reactor control system or by manual means controlled by the unit Operator. The shutdown rods are manually controlled by the unit Operator. The automatic function of the control rod drive system maintains a programmed average temperature in the Reactor Coolant System (RCS) by adjusting the position of the rods which regulates core reactivity. During steady-state operation the reactor control system maintains RCS average temperature to within plus or minus 3.5 degrees Fahrenheit of the reference temperature. Consistent with this, intentional rod movement occurs when either:

1. A unit Operator manually demands motion from the rod control system, or

2. A temperature or power mismatch demands motion while the rod control system is being controlled automatically.

Alarm and monitoring capabilities of the proposed alternate plan:

Once implemented, the proposed alternate monitoring will provide the ability for a unit Operator to continuously monitor the position of the affected rod via a recorder. The plant computer provides an output signal representative of rod position in steps to a digital recorder located on a control board (1-M-5) in the Main Control Room (MCR). This MCR board is adjacent to the control board (1-M-4) where the displays for the ARPIs are located. Further, the implementation of the proposed monitoring method makes the deviation monitor for the affected rod continuously available. The functions of the recorder and the deviation monitor are available to indicate or alarm for intended or unintended rod movements.

In order to monitor if the affected rod stepped in the direction that was demanded, the method of implementing the alternate means was modified from that documented in TVA's initial amendment request. Figure 1 (below) documents the changes that were made to the monitoring circuit which adds the capability to monitor the current of the lift coil using a circuit similar to the circuit used to monitor the stationary gripper coil. The timing of the lift coil energizing will be analyzed by a software algorithm, and compared to demand signals generated by the rod control system to determine if the rod stepped in the direction demanded.

For any of the following three situations, the software algorithm will generate a plant computer alarm:

1. The rod stepped in the wrong direction.

2. The rod stepped with no demand (whether in automatic or manual control).

3. The alternate monitoring circuit fails.

Once an alarm is received, Required Action A.2.1 is applicable and the position of the rod will have to be determined within 8 hours of the alarm by use of the incore detectors. In addition, the computer alarm generated by either of the first two conditions may be accompanied by a rod control system urgent alarm which is annunciated in the main control room.

If a malfunction of the rod control system occurs or the temporary alteration fails, the software will cause an annunciation via the ICS with the statement that the alternate means is not reliable. The following conditions will cause this alarm:

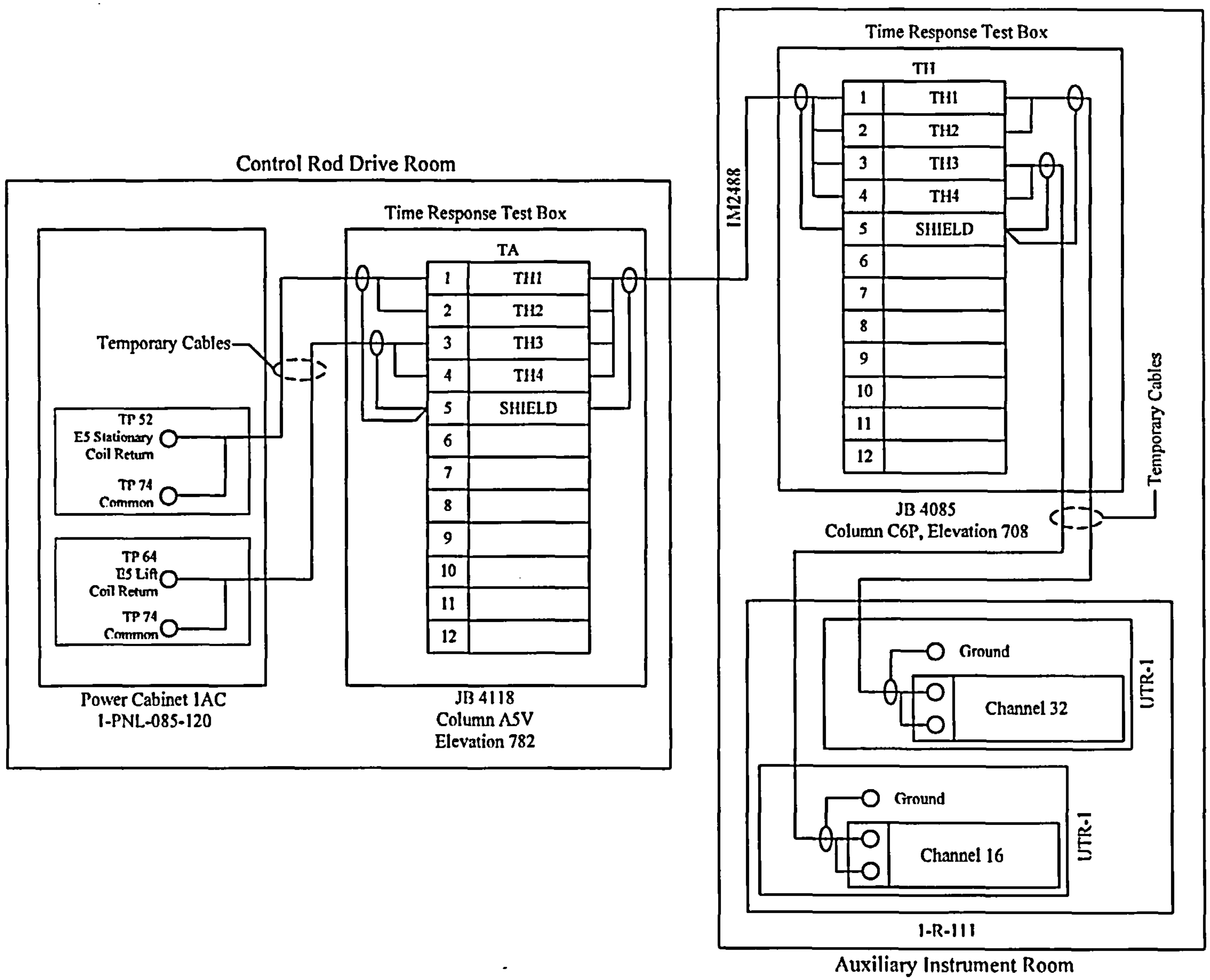
- The loss of the signal from the stationary coil with no change in the lift coil signal. For this condition there will be no indication of rod motion which suggests the alternate means failed or rod control malfunctioned.

- The indication of outward rod motion (sequencing of stationary and lift coil) when inward rod motion was demanded.

- The indication of inward rod motion when outward rod motion was demanded.

- The loss of the stationary coil signal for an extended (abnormal) duration.

Figure 1
Example of Wiring for the Monitoring of Rod Control System Parameters
Example Based on Control Rod E-5



NRC Question 5:

Provide design and licensing basis information related to the rod of most worth.

TVA Response to Question 5:

Section 4.3.1.5, "Shutdown Margins with Vessel Head in Place," of the Updated Final Safety Analysis Report (UFSAR) clarifies that WBN is analyzed for events involving a reactor trip that the single, highest worth Rod Cluster Control Assembly (RCCA) is postulated to remain untripped in its full-out position. The postulation of the events in this manner partially satisfies GDC 26, "Reactivity Control System Redundancy and Capability," and GDC 27, "Combined Reactivity Control Systems Capability." The principal discussion regarding the compliance with these two GDCs is provided in Section 3.1.2.3, "Protection and Reactivity Control Systems," of the UFSAR. NRC's review of WBN's compliance with the GDCs is documented in the sections of the Safety Evaluation Report (SER – NUREG 0847) listed below:

SER Dated June 1982			
Sections Addressing GDC 26		Sections Addressing GDC 27	
3.9.4	"Control Rod Drive Systems"	3.9.4	"Control Rod Drive Systems"
4.3.1	"Design Bases"	4.3.1	"Design Bases"
4.3.2.3	"Control"	4.3.4	"Summary of Evaluation Findings"
4.3.4	"Summary of Evaluation Findings"	4.6	"Functional Design of Reactivity Control Systems"
4.5.1	"Control Rod Drive Structural Materials"	6.3.4	"Performance Evaluation"
4.6	"Functional Design of Reactivity Control Systems"	15.3.4	"Reactor Coolant Pump Rotor Seizure"
9.3.2	"Process Sampling System"	15.3.5	"Reactor Coolant Pump Shaft Break"
15.1	"General Discussion"		
15.2	"Normal Operation and Anticipated Transients"		

The design basis accidents for WBN Unit 1 are defined in Design Criteria (DC) WB-DC-40-64, "Design Basis Events Design Criteria." This DC specifies those events that shall be used in the design to establish the performance requirements of structures, systems, and components to protect the health and safety of the public. Listed below are the design basis accidents discussed in this DC that assume the highest worth rod is stuck in its fully withdrawn position. Also listed in the table are the applicable UFSAR sections and the sections of the SERs that document NRC's review of the accident:

Design Basis Accident	UFSAR Section	SER June 1982 Section	SER Supplement/ Section
Uncontrolled Rod Cluster Control Assembly Bank Withdrawal from a Subcritical or Hot Zero Power Condition	15.2.1	15.2.4.1	7 / 15.2.4.1 13 / 15.2.4.1
Uncontrolled Rod Cluster Control Assembly Bank Withdrawal at Power	15.2.2	15.2.4.2	N/A
Rod Cluster Control Assembly Misalignment (With Reactor Trip)	15.2.3	15.2.4.3	N/A

Design Basis Accident	UFSAR Section	SER June 1982 Section	SER Supplement/ Section
Uncontrolled Boron Dilution	15.2.4	15.2.4.4	4 / 15.2.4.4 14 / 15.2.4.4
Partial Loss of Forced Reactor Coolant Flow	15.2.5	15.2.1	13 / 15.2.1 14 / 15.2.1
Loss of Normal Feedwater	15.2.8	15.2.1	13 / 15.2.1 14 / 15.2.1
Loss of Offsite Power	15.2.9	8.3.1	2 / 8.3.1 7 / 8.3.1 13 / 8.3.1 14 / 8.3.1 20 / 8.3.1
Excessive Heat Removal Due to Feedwater System Malfunction	15.2.10	15.2.2	N/A
Excessive Load Increase Incident	15.2.11	15.2.2	N/A
Accidental Depressurization of the Reactor Coolant System	15.2.12	15.2.3	18 / 15.2.3
Accidental Depressurization of the Main Steam System	15.2.13	15.2.2	N/A
Inadvertent Safety Injection Operation	15.2.14	15.2.3	18 / 15.2.3
Main Steamline Break	15.4.2	15.3.2 15.4.2	3 / 15.3.2 14 / 15.3.2
Main Feedwater Line Rupture	15.4.2.2	15.3.3	14 / 15.3.3
Single Reactor Coolant Pump Locked Rotor or Shaft Break	15.4.4	15.3.4, 15.3.5	N/A
Complete Loss of Forced Reactor Coolant Flow	15.4.4	15.2.1	13 / 15.2.1 14 / 15.2.1

<u>NRC Question 6:</u>

Update the proposed changes to LCO 3.1.8 to clarify that the alternate process may only be applied to one inoperable ARPI. Also clarify in the Bases for LCO 3.1.8, the Rod Control System parameters that will monitored by the alternate process.

<u>TVA Response to Question 6:</u>

An updated annotated version of the Technical Specifications and the Bases is provided in Enclosure 2.

<u>NRC Question 7:</u>

Describe the procedural controls that will be in place, whenever the alternate monitoring process is used, to ensure the Operators will be aware that the rod bottom light will not work for the affected rod.

TVA Response to Question 7:

Described in the response to Question 3 above is the process that will be followed to determine the plant documents that must be revised when the TA is implemented. Key documents like Surveillance Instructions and other procedures will be addressed by this process. The intent of Question 7 was to specifically identify the measures that will be taken to ensure the Operations staff is aware that the TA has been implemented and the alternate monitoring must be implemented. TVA intends to use two established processes (discussed below) to ensure the Operations staff is aware of the changes being made to the circuit for the inoperable ARPI. Both of these processes are controlled by Standard Department Procedure OPDP-1, "Conduct of Operations:"

1. Issuance of a Standing Order:

   Standing Orders are used to convey Information such as administrative policy, designation of turnover times, requirements to transmit particular operating data to management, limitations of access to certain areas and equipment, shipping and receiving instructions, and other similar long-term or policy matters. For the implementation of the TA addressed in the proposed amendment, use of a Standing Order ensures the staff is aware the TA is in place, the equipment malfunction the TA addresses and any relevant precautions or additional information.

2. Shift Turnover Checklist:

   Section 3.11.1, "Shift Turnover Checklist," documents two requirements relevant to the control of the implementation of the TA. First, the oncoming operators must review the documents specified on their checklists before assuming responsibility for their shift position. For the oncoming shift the checklist requires the review of Standing Orders and TAs. Secondly, the individual being relieved is responsible for passing on all pertinent information concerning work under his jurisdiction to the Operator coming on-shift.

In addition, an overview of the Standing Order may be included in requalification training for the licensed operators. This will be contingent on the time period the Standing Order remains in effect.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1
DOCKET NUMBER 390

PROPOSED LICENSE AMENDMENT REQUEST WBN-TS-03-12
ANNOTATED TECHNICAL SPECIFICATIONS (TS) AND BASES

TVA held a teleconference with NRC on April 8, 2005, to discuss the proposed amendment. During the teleconference, NRC stated that changes proposed to LCO 3.1.8 must be updated to clarify that the alternate process may only be applied to one inoperable ARPI. NRC also indicated that the Bases for LCO 3.1.8 must be updated to discuss the Rod Control System parameters that will monitored by the alternate process. The version of LCO 3.1.8 and the Bases for LCO 3.1.8 provided in this enclosure reflect the changes discussed with NRC.

Listed below are the pages affected by the proposed revision. For the attached annotated pages, wording additions are shown as bold-italicized text and deletions are shown as strikethrough.

TS and Bases
Affected Page List:

3.1-17
3.1-18
3.1-19
B 3.1-51
B 3.1-52
B 3.1-53
B 3.1-54
B 3.1-54a

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 Rod Position Indication

LCO 3.1.8 The Analog Rod Position Indication (ARPI) 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.

CONDITION	REQUIRED ACTION		COMPLETION TIME
-----*NOTE*----- ***Rod position monitoring by Required Actions A.2.1 and A.2.2 may only be applied to one inoperable ARPI 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.*** -----	A.1	Verify the position of the rods with inoperable position indicators by using movable incore detectors.	Once per 8 hours
	<u>OR</u>		
	A.2.1	***Verify the position of the rod with the inoperable position indicator by using movable incore detectors.***	***8 hours*** ***<u>AND</u>*** ***Once every 31 days thereafter*** ***<u>AND</u>*** ***8 hours, if rod control system parameters indicate unintended movement***
A. One ARPI per group inoperable for one or more groups.	***<u>AND</u>***		(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.*	*16 hours* ***AND*** *Once per 8 hours thereafter*
	AND	
	A.2.3 Verify the position of the rod with an inoperable position indicator by using movable incore detectors.	*8 hours, if the rod with an inoperable position indicator is moved greater than 12 steps.* ***AND*** *Prior to increasing THERMAL POWER above 50% RTP and within 8 hours of reaching 100% RTP*
	OR	
	A.3~~2~~ 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 movable incore detectors.	4 hours
	OR	
	B.2 Reduce THERMAL POWER to ~~≤~~ *less than or equal to* 50% RTP.	8 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One demand position indicator per bank inoperable for one or more banks.	C.1.1 Verify by administrative means all ARPIs for the affected banks are OPERABLE.	Once per 8 hours
	<u>AND</u>	
	C.1.2 Verify the most withdrawn rod and the least withdrawn rod of the affected banks are ~~≤~~ ***less than or equal to*** 12 steps apart.	Once per 8 hours
	<u>OR</u>	
	C.2 Reduce THERMAL POWER to ~~≤~~ ***less than or equal to*** 50% RTP.	8 hours
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3.	6 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.8.1	Verify each ARPI agrees within 12 steps of the group demand position for the full indicated range of rod travel.	18 months

BASES

ACTIONS (continued)

A.1

When one ARPI channel per group fails, the position of the rod can still be determined by use of the incore movable detectors. 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 RCCA 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 the ARPI to be inoperable is inaccessible due to operating conditions (adverse radiological or temperature environment). In this situation, repair of the ARPI cannot occur until the unit is in an operating MODE that allows access to the failed components.

In addition to the initial 8 hour verification, Required Action A.2.1 also requires the following for the rod with the failed ARPI:

1. ***Verification of the position of the rod every 31 days using the incore movable detectors.***
2. ***Verification of the position of the rod using the incore movable detectors within 8 hours of the performance of Required Action A.2.2 whenever there is an indication of unintended rod movement based on the parameters of the rod control system.***

(continued)

ACTIONS

<u>A.2.1, A.2.2</u> (continued)

Required Action A.2.2 is in lieu of the verification of the position of the rod using the incore movable detectors every 8 hours as required by Required Action A.1. This action alleviates the potential for excessive wear on the incore system due to the repeated use of the incore detectors. Once the position of the rod with the failed ARPI is confirmed through the use of the moveable incore detectors in accordance with Required Action A.2.1, the parameters of the rod control system must be monitored until the failed ARPI is repaired. Should the review of the rod control system parameters indicate unintended movement of the rod, the position of the rod must be verified within 8 hours in accordance with Required Action A.2.1. Should there be unintended movement of the rod with the failed ARPI, an alarm will be received. Alarms will also be received if the rod steps in a direction other than what was demanded, and if the circuitry of the TA fails. Receipt of any alarm requires the verification of the position of the rod in accordance with Required Action A.2.1.

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 shall only be applied to one rod with an inoperable ARPI and shall only be allowed until the end of the current cycle. Further, 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(s) could have safely been performed.

As indicated previously, the modifications required for the monitoring of the rod control system will be implemented as a TA. Implementation of the TA includes a review for the impact on plant procedures and training. This ensures that changes are initiated for key issues like the monitoring requirements in the control room, and operator training on the temporary equipment.

<u>A.2.3</u>

Required Action A.2.3 addresses two contingency measures when the TA is utilized:

1. ***Verification of the position of the rod with the inoperable ARPI by use of the moveable incore detectors, whenever the rod is moved greater than 12 steps.***
2. ***Operation of the unit when THERMAL POWER is less than or equal to 50% RTP.***

For the first contingency, the rod group alignment limits of LCO 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

(continued)

BASES

ACTIONS

A.2.3 ***(continued)***

alignments ensure that the assumptions in the safety analysis will remain valid and that the assumed reactivity will be available to be inserted for a unit shutdown. Therefore, this conservative measure ensures LCO 3.1.5 is met whenever the rod with the inoperable ARPI is moved greater than 12 steps. For the second contingency, the reduction of THERMAL POWER to less than or equal to 50% RTP puts the core into a condition where rod position is not significantly affecting core peaking factors (Ref. 13). Consistent with LCO 3.0.4 and this action, unit startup and operation to less than or equal to 50% RTP may occur with one ARPI per group inoperable. However, prior to escalating THERMAL POWER above 50% RTP, the position of the rod with an inoperable ARPI must be verified by use of the moveable incore detectors. Once 100% RTP is achieved, the position of the rod must be reverified within 8 hours by use of the moveable incore detectors. Monitoring of the rod control system parameters in accordance with Required Action A.2.2 for the rod with an inoperable ARPI may resume upon completion of the verification at 100% RTP.

A.3 ~~2~~

Required Action A.3 applies whenever the TA is not utilized. The discussion for Required Action A.2.3 (above) clarified that a ~~R~~reduction of THERMAL POWER to ~~≤~~ ***less than or equal to*** 50% RTP puts the core into a condition where rod position is not significantly affecting core peaking factors (Ref. 13). The allowed Completion Time of 8 hours is reasonable, based on operating experience, for reducing power to ~~≤~~ ***less than or equal to*** 50% RTP from full power conditions without challenging plant systems and allowing for rod position determination by Required Action A.1 above. ***Consistent with LCO 3.0.4 and this action, unit startup and operation to less than or equal to 50% RTP may occur with one ARPI per group inoperable. Thermal Power may be escalated to 100% RTP as long as Required Action A.1 is satisfied.***

B.1 and B.2

These Required Actions clarify that when one or more rods with inoperable position indicators have been moved in excess of 24 steps in one direction, since the position was last determined, the Required Actions of A.1 and A.2 are still appropriate but must be initiated promptly under Required Action B.1 to begin verifying that these rods are still properly positioned, relative to their group positions.

If, within 4 hours, the rod positions have not been determined, THERMAL POWER must be reduced to ~~≤~~ ***less than or equal to*** 50% RTP within 8 hours to

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

avoid undesirable power distributions that could result from continued operation at >*greater than* 50% RTP, if one or more rods are misaligned by more than 24 steps. The allowed Completion Time of 4 hours provides an acceptable period of time to verify the rod positions.

C.1.1 and C.1.2

With one demand position indicator per bank inoperable, the rod positions can be determined by the ARPI System. Since normal power operation does not require excessive movement of rods, verification by administrative means that the rod position indicators are OPERABLE and the most withdrawn rod and the least withdrawn rod are ≤ ***less than or equal to*** 12 steps apart within the allowed Completion Time of once every 8 hours is adequate.

C.2

Reduction of THERMAL POWER to ≤ ***less than or equal to*** 50% RTP puts the core into a condition where rod position is not significantly affecting core peaking factor limits (Ref. 13). The allowed Completion Time of 8 hours provides an acceptable period of time to verify the rod positions per Required Actions C.1.1 and C.1.2 or reduce power to ≤ ***less than or equal to*** 50% RTP.

D.1

If the Required Actions cannot be completed within the associated Completion Time, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours. The allowed Completion Time is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.1.8.1

Verification that the ARPI agrees with the demand position within 12 steps ensures that the ARPI is operating correctly.

The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for unnecessary plant transients if the SR were performed with the reactor at power. Operating experience has shown these components usually pass the SR when performed at a Frequency of once every 18 months. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

(continued)

BASES (continued)

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix A, General Design Criterion 13, "Instrumentation and Control."
2. Watts Bar FSAR, Section 15.2.1, "Uncontrolled Rod Cluster Control Assembly Bank Withdrawal From a Subcritical Condition."
3. Watts Bar FSAR, Section 15.2.2, "Uncontrolled Rod Cluster Control Assembly Bank Withdrawal At Power."
4. Watts Bar FSAR, Section 15.2.3, "Rod Cluster Control Assembly Misalignment."
5. Watts Bar FSAR, Section 15.2.4, "Uncontrolled Boron Dilution."
6. Watts Bar FSAR, Section 15.2.5, "Partial Loss of Forced Reactor Coolant Flow."
7. Watts Bar FSAR, Section 15.2.13, "Accidental Depressurization of the Main Steam System."
8. Watts Bar FSAR, Section 15.3.4, "Complete Loss of Forced Reactor Coolant Flow."
9. Watts Bar FSAR, Section 15.3.6, "Single Rod Cluster Control Assembly Withdrawal At Full Power."
10. Watts Bar FSAR, Section 15.4.2.1, "Major Rupture of Main Steam Line."
11. Watts Bar FSAR, Section 15.4.4, "Single Reactor Coolant Pump Locked Rotor."
12. Watts Bar FSAR, Section 15.4.6, "Rupture of a Control Rod Drive Mechanism Housing (Rod Cluster Control Assembly Ejection)."
13. Watts Bar FSAR, Section 4.3, "Nuclear Design."
14. ***Watts Bar FSAR, Section 7.7.1.3.2, "Main Control Room Rod Position Indication."***