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

NOV 13 2001

TVA-WBN-TRM-01-08

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

10 CFR 50.90

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - TECHNICAL REQUIREMENTS MANUAL (TRM) CHANGE NO. 01-08 - ADDITION OF NEW TECHNICAL REQUIREMENTS FOR SHUTDOWN BOARD ROOM AIR CONDITIONING (3.7.6) AND 480 VOLT BOARD ROOM AIR CONDITIONING (3.7.7)

In accordance with the provisions of 10 CFR 50.59 and 50.90, TVA is submitting a request for an amendment to change the Technical Requirements Manual (TRM) for Unit 1. The proposed amendment would revise the WBN Unit 1 TRM to add two new Sections, 3.7.6, "Shutdown Board Room (SDBR) Air Conditioning System (ACS)," and 3.7.7, "Elevation 772.0 480 Volt Board Room Air Conditioning (AC) Systems." Each specification provides specific actions and associated completion times for various out-of-service conditions associated with these safety-related air conditioning systems. New technical surveillance requirements and TR Bases are also included.

The proposed technical requirements are primarily needed due to overly restrictive guidance through the application of WBN Technical Specification Limiting Condition of Operation (LCO) 3.0.3 for coping with brief occurrences of multiple trains or systems of air conditioning equipment being concurrently out of service or inoperable. This safety-related air conditioning equipment provides cooling to rooms containing electrical equipment utilized during normal operation and mitigation of accidents. Under the subject change, a limited duration of up to 12 hours is proposed during which concurrent trains or systems of air conditioning could be out of service. This provision would allow sufficient time to correct the typical types of minor equipment issues that have occurred to date (such as broken drive belts, replacement of oil filters, etc.), which can potentially result in concurrent inoperable cooling trains, and thereby avoid an unnecessary plant shutdown currently required by LCO 3.0.3.

D030
Rec'd 11/23/01

Ordinarily, TVA may make changes and revisions to the WBN TRM without obtaining prior NRC review, provided the changes do not require staff's review pursuant to 50.59. TVA's preliminary 50.59 evaluation for the proposed change determined that NRC review is necessary since the alignment of the air conditioning equipment, during the proposed 12 hour time period, departs from the current design description in the FSAR, namely, the ability of the redundant unit to automatically start and operate to provide required cooling. As discussed herein, the redundant start design features have not been changed, except that function would not be required for up to 12 hours. The subject amendment request is not considered a RG-1.174 risk-informed initiative, however, quantitative risk insights based on the WBN Probabilistic Risk Assessment have determined the risk increase for the 12 hour duration is acceptable.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the change is exempt from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). The WBN Plant Operations Review Committee and the WBN Nuclear Safety Review Board have reviewed this proposed change and have determined that operation of WBN Unit 1 in accordance with the proposed change will not endanger the health and safety of the public. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Tennessee State Department of Public Health.

Enclosure 1 to this letter provides the description and evaluation of the proposed change, including TVA's determination that the proposed change does not involve a significant hazards consideration, and is exempt from environmental review. Enclosure 2 provides the revised TRM pages which incorporate the proposed change.

TVA requests that the revised TRM be approved as early as practical and that the revised TRM be made effective within 30 days of NRC approval.

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There are no regulatory commitments associated with this request. If you have any questions about this change, please contact me at (423) 365-1824.

Sincerely,

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

Enclosures
cc: See page 4

Subscribed and sworn to before me
on this 13th day of November, 2001.

E. Jeannette Lowy
Notary Public
My Commission Expires May 21, 2005

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN)
UNIT 1 - DOCKET NO. 390

PROPOSED TECHNICAL REQUIREMENTS MANUAL (TRM) CHANGE TRM-01-08
DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

I. DESCRIPTION OF THE PROPOSED CHANGE

The proposed license amendment would revise the Watts Bar Nuclear Plant (WBN) Unit 1 Technical Requirements Manual (TRM) to add two new Sections, 3.7.6, "Shutdown Board Room (SDBR) Air Conditioning System (ACS)," and 3.7.7, "Elevation 772.0 480 Volt Board Room Air Conditioning (AC) Systems." Each specification provides specific actions and associated completion times for various out-of-service conditions associated with these safety-related air conditioning systems. New technical surveillance requirements and TR Bases are also included. In summary, these new specifications provide the following:

TR 3.7.6 Shutdown Board Room ACS

- Two SDBR ACS trains would be required Operable in Modes 1-6 and during movement of irradiated fuel assemblies.

- With one of two trains of SDBR ACS inoperable, restoration would be required within 30 days.

  - If not met in Modes 1-4, then shutdown.
  - If not met in Modes 5, 6, or during movement of irradiated fuel assemblies, then ensure Operable train is in operation.

- With two trains inoperable, restore 1 SDBR ACS train within 12 hours.

  - If not met in Modes 1-4, then shutdown.
  - If not met in Modes 5, 6, or during movement of irradiated fuel assemblies, enter the required actions for TS LCO 3.8.10 "Distribution Systems - Shutdown."

TR 3.7.7 Elev. 772.0 480 Volt Board Room AC Systems

- Four 480V Board Room AC Systems would be required Operable in Modes 1-6 and during movement of irradiated fuel assemblies.

- With one or both 480V Bd Rm AC Systems of the same train inoperable or two 480V Bd Rm AC Systems of the opposite train and Unit inoperable, restoration would be required within 30 days. In addition, compensatory measures would be required

including: (1) Opening doors and operation of temporary fans to ensure compliance with normal temperature limits, and (2) Verification within 12 hours of the operability of at least 1 train of pressurizing fans and battery exhaust fans.

- If not met in Modes 1-4, then shutdown.
- If not met in Modes 5, 6, or during movement of irradiated fuel assemblies, enter TS Conditions and Required Actions for affected electrical equipment.

- With two 480V Board Room AC Systems of the same Unit inoperable, or three or more 480V Board Room AC Systems inoperable, restore at least one 480V Board Room AC System per unit within 12 hours.

  - If not met in Modes 1-4, then shutdown.
  - If not met in Modes 5, 6, or during movement of irradiated fuel assemblies, enter TS Conditions and Required Actions for affected electrical equipment.

TVA's proposed changes are illustrated by the revised pages provided in Enclosure 2.

II. REASON FOR THE PROPOSED CHANGE

The proposed technical requirements are needed due to a lack of specific guidance in the WBN Technical Specifications for coping with one or more trains (in the case of the SDBR ACS), or one or more AC systems (in the case of the 480V board room AC) out of service or inoperable. This safety-related air conditioning equipment provides cooling to maintain required temperatures in rooms containing electric equipment utilized during normal operation and in the mitigation of design basis events (DBEs). Therefore, these AC systems are considered attendant equipment and are required to be operable according to the WBN Technical Specifications definition of operability. Inoperability of attendant equipment typically requires that supported TS features are in turn declared inoperable and specified TS Actions taken which may include plant shutdown. However, such actions may be over-restrictive, based on the time required to correct the typical types of WBN equipment issues that have occurred to date, and in consideration of the significant time required for temperatures in the rooms served to approach the applicable equipment temperature limits. The subject AC systems differ from typical attendant features in that TS LCOs for the supported electrical equipment do not immediately need to be declared "not met" in the event portions of the SDBR or 480V Board Room AC become inoperable. WBN analyses have been utilized to provide criteria and timeframes for restoring these AC systems to service.

A scenario with over restrictive consequences involves the potential for a plant shutdown due to a brief occurrence of two AC systems or trains concurrently being out of service. For example, one ACS train may be out of service for maintenance or

due to equipment malfunction, such as a chiller trip on high oil pressure. A failure of the redundant equipment to automatically start or to start and trip would result in a brief period during which all air conditioning for the areas cooled is temporarily lost. In this instance, restoration of at least one train of air conditioning is usually achievable within a short time frame by restarting the equipment, replacement of drive belts, changing oil filters, etc., with no adverse environmental affects on the rooms or electrical equipment being cooled. However, because this attendant air conditioning equipment is inoperable, multiple trains of supported equipment must also be declared inoperable which results in unnecessary entry into LCO 3.0.3 and unit shutdown.

Therefore, the proposed TRM changes provide an organized, pre-planned set of conditions and required actions to ensure that restoration of required components is either accomplished within a reasonable time frame, or other actions are taken, including unit shutdown.

TVA's evaluation of similar industry changes did not identify a precedent to this request.

III. SAFETY ANALYSIS

TR 3.7.6 - Shutdown Board Room (SDBR) Air Conditioning System (ACS)

Design Function of SDBR ACS

The SDBR ACS is a safety related system designed to maintain temperatures and relative humidities for safety related electrical equipment located in the shutdown board rooms, auxiliary control room, auxiliary control instrument rooms, battery board rooms, and mechanical equipment rooms on elevation 757.0 of the auxiliary building during both normal and post accident conditions. The design basis of the SDBR ACS is to maintain the required temperatures in the rooms served for all modes of operation and for up to 100 days following certain DBEs. The SDBR ACS is considered as "attendant" equipment. The SDBR ACS is described in UFSAR Section 9.4.3 and depicted in UFSAR Figure 9.4-15.

The system consists of two 100% capacity redundant air handling units (AHUs) per reactor unit (one in standby), a chilled water circulating pump and piping, and a chiller package which consists of a centrifugal compressor with a two section heat exchanger (evaporator and condenser). The condenser cooling water is supplied by the Essential Raw Cooling Water (ERCW) System. Normally, one of two chillers is in operation, while the opposite train is in standby mode. The unit in standby starts when the operating unit fails.

During normal operation, pressurizing fans supply outside air to maintain the SDBR areas at a slightly positive pressure with respect to the outside to ensure any air leakage is in the direction of areas of progressively greater contamination

potential. The pressurizing fans operate independently of the ACS and are not within the scope of proposed TR 3.7.6.

The SDBR ACS is arranged in two redundant, safety related trains. A single active failure of a component of the SDBR ACS, with a loss of off-site power, does not impair the ability of the system to perform its design function. In the automatic mode, the redundant system will start if any of the following occurs:

- Low differential pressure across the chilled water circulation pump of the operating train
- Low air flow measured at the outlet of either air handling unit fan
- A thermostat sensing a temperature greater than the setpoint value

During all modes of operation, the SDBR ACS maintains adequate air temperatures to assure optimum operation of the safety-related equipment it serves.

Existing Technical Requirement (TR) 3.7.5, "Area Temperature Monitoring," provides nominal temperature limits for plant areas including the Elevation 757 shutdown board rooms supported by the SDBR ACS. The TR limits address service temperatures and thermal aging considerations for electrical equipment to ensure proper hardware qualification so that the equipment remains functional during and after specified DBEs. The TR provides a normal limit of 85°F for the shutdown board rooms and imposes an abnormal limit of 104°F which if exceeded, requires restoring temperature to within limits or declaring affected equipment inoperable within four hours. These temperature limits ensure temperatures do not exceed IEEE standards for components in a mild environment, therefore the equipment in these areas is not subject to the requirements of the 10 CFR 50.49 Environmental Qualification Program. All of the rooms served by the SDBR ACS are classified as mild environments based on the WBN design criteria for environmental design. As discussed herein, TVA does not currently anticipate a need to revise the limits or required actions of TR 3.7.5 as a result of the proposed change.

Proposed Specification - TR 3.7.6

The proposed TR provides operational guidance for coping with one, or both of the SDBR ACS trains out of service. In Modes 1, 2, 3, 4, 5, and 6, and during movement of irradiated fuel assemblies, the SDBR ACS must be OPERABLE to ensure that the SDBR area temperatures will not exceed electrical equipment operational requirements. The proposed TR requires two independent and redundant trains of the SDBR ACS to be OPERABLE to ensure that at least one is available, assuming a single failure disabling the opposite train concurrent with a postulated DBE. Total system failure could eventually result in exceeding the operating temperature limits for the electrical equipment served in the SDBR areas during a DBE. As discussed in the proposed Bases of TR 3.7.6, the SDBR ACS is considered to be OPERABLE when the individual components necessary to maintain

the SDBR area temperatures are OPERABLE in both trains. These components include the chiller packages, chilled water pumps, AHUs, and associated temperature, differential pressure, and air flow control instrumentation. In addition, the SDBR ACS must be operable to the extent that air circulation can be maintained.

Proposed TR 3.7.6, Condition A, addresses one ACS train becoming inoperable and requires that train to be restored within 30 days. In this condition, the remaining OPERABLE SDBR ACS train has 100% cooling capacity; therefore, no compensatory actions are necessary to maintain area temperatures within TR 3.7.5 limits during continued full power operation. However, the overall reliability is reduced because a postulated single failure in the OPERABLE SDBR ACS could result in loss of SDBR ACS function.

The 30 day completion time is based on a direct analogy to the Control Room Emergency Air Temperature Control System (CREATCS) addressed in TS 3.7.11 which allows 30 days to restore an inoperable CREATCS train to OPERABLE status, prior to initiating unit shutdown. CREATCS consists of two safety related AC trains, each with 100% cooling capacity. Similar to CREATCS, the SDBR ACS has similar redundancy in that failure of one train of cooling will not preclude proper operation of either train of electrical equipment served during mitigation of a DBE.

A Note has been added to exclude the MODE change restriction of TR 3.0.4 for Condition A. This exception allows entry into the applicable MODE (1 through 4) while relying on the ACTIONS even though the ACTIONS may eventually require unit shutdown. This exception is acceptable due to the low probability of an event requiring additional air conditioning systems.

Proposed TR 3.7.6, Condition B, addresses a second train of SDBR ACS becoming inoperable resulting in a complete loss of safety related cooling for areas served by SDBR ACS. In that event, air temperatures in some rooms could eventually reach, or exceed acceptable limits. Therefore, the proposed actions for Condition B require that at least one train of SDBR ACS must be restored to OPERABLE status within 12 hours. A WBN transient temperature analysis demonstrates that peak temperatures in each room served by SDBR ACS remain significantly below the mild environment temperature limit of 130°F for a period of 24 hours assuming a complete loss of air conditioning to all rooms served by SDBR ACS. The analysis is bounding for normal operational conditions since it conservatively considers full LOCA cooling loads within each room, normal maximum (summer time) starting temperatures in each room, maximum LOCA surrounding room temperatures, and maximum design outside air temperatures including solar effects.

The 12 hour Completion Time serves to minimize exposure to an initiating event concurrent with both ACS trains inoperable. TVA's analysis determined this time frame is reasonable based on the low probability of occurrence of particular events during this period. The events of concern are those events that could

result in significant radiation dose in areas containing components associated with the SDBR ACS. These include the various LOCA initiating events and a steam generator tube rupture (SGTR). Due to their potential radiation dose, each could hinder or eliminate the ability of maintenance crews to perform maintenance in areas necessary to restore affected air conditioning equipment.

The Watts Bar Nuclear Plant Unit 1 Probabilistic Safety Analysis (PSA), (WBN-Rev 2) was used to evaluate plant response to initiating events. The initiating event categories and frequencies are based on published sources which are referenced in the WBN PSA. Each event category leads to a plant trip (i.e., reactor trip or a turbine trip). A comparison of initiating event frequencies used in the WBN PSA-Rev 2 with a more recent publication (NUREG/CR-5750, "Rates of Initiating Events at U.S. Nuclear Power Plants: 1987 - 1995") is presented in Table 1. As seen by the results in Table 1, the initiating event frequencies used in the WBN PSA-Rev 2 are more conservative than the frequencies published in NUREG-5750. The contributions of the initiating events to core damage and LERF are also included in Table 1.

Based on these analyses, the probability of the LOCA initiating events (including SGTR) in 12 hours using the initiating event frequencies from WBN PSA-Rev 2 is 7.93E-5 and the probability of these events in 12 hours using the initiating event frequencies from NUREG-5750 is 1.88E-5. Although these probabilities are low, they are above the NRC established threshold of 1E-6 per year for design basis events with the potential to result in radiation exposures to the public. However, if these events were to occur, the probability of the event leading to core damage or a large early release is small for a 12 hour period. The probability of these events resulting in core damage for a 12-hour period was calculated to be 2.57E-08. The probability of these events resulting in a large early release was calculated to be 4.45E-10. The SDBR ACS and 480V Board Room AC Systems were modeled in the PSA. In the WBN PSA, the top events for the SDBR are listed as "V1" for the Unit 1 area and "V2" for the Unit 2 areas. The top events for the 480V Board Room are listed as "VINV1" for the Unit 1 room and "VINV2" for the Unit 2 room. The Risk Achievement Worth for all four of these top events is 1.0. This means that the risk increase due to the air conditioning in any of these areas being out of service is small as defined by Regulatory Guide 1.174. Therefore, the proposed completion times do not represent a significant challenge to plant safety because of the low probability of occurrence of LOCA or SGTR initiating events during this brief outage time, and due to the low contribution of these events leading to core damage and large early release.

Table 1 - Initiating Event Frequencies and the Contributions of Initiating Events to Core Damage and LERF

Initiating Events	Model	Frequency per Year			
		Initiating Events from WBN PSA, Rev 2	Initiating Events from NUREG 5750	LOCA Contribution to Core Damage	LOCA Contribution to End State LERF [5]
Loss of Coolant Events	ELOCA	2.66E-07	*2.66E-07	2.6026E-07	3.5096E-09
	LLOCA	2.03E-04	5.06E-06	2.5554E-06	3.9324E-08
	MLOCA	4.65E-04	4.00E-05	1.9860E-06	3.3314E-08
	SLOCAN[2]	5.83E-03	5.00E-04	9.0480E-06	8.6966E-08
	SLOCAI[3]	2.30E-02	6.20E-03	6.8901E-07	4.8849E-08
	SGTR	2.84E-02	7.00E-03	4.1777E-06	6.4000E-08
	XI[4]	4.00E-06	*4.00E-06	3.3360E-09	3.3258E-09
	XS[4]	7.20E-06	*7.20E-06	4.0776E-08	4.0076E-08
Total Frequency per Year [1]		5.79E-02	1.37E-02	1.876E-05	3.25E-7
Frequency per 12 hours		**7.93E-05**	**1.88E-05**	**2.57E-08**	**4.45E-10**

* These values are not from NUREG-5750, the plant specific values developed are used.

1 Frequency of all LOCA initiating events
2 A small break LOCA is defined as any RCS inventory loss greater than the makeup ability of one centrifugal charging pump through normal charging up to a 2-inch diameter break. These nonisolable LOCAs are primarily RCP failures.
3 A small break LOCA is defined as any RCS inventory loss greater than the makeup ability of one centrifugal charging pump through normal charging up to a 2-inch diameter break (same as note 2). These isolable LOCAs are primarily PORV failures.
4 An interfacing systems LOCA is initiated by failures of valves that isolate the reactor coolant system from low pressure systems outside containment.
5 The RISKMAN quantifications are calculated using a cutoff frequency of 1.00E-10.

In addition, a NOTE requires that no more than one SDBR ACS train may be made simultaneously inoperable on a pre-planned basis for maintenance, modifications, or testing, since Condition B is intended to address unforeseen circumstances. This serves to further minimize the likelihood of two SDBR ACS trains being inoperable concurrent with a DBE.

TVA currently does not anticipate a need to revise the TR 3.7.5 104°F abnormal temperature limit for the shutdown board rooms or the associated TR actions. Based on predicted worst case temperatures during accident conditions, it is expected that most equipment restoration activities during normal operations could be accomplished within the applicable time limits of TR 3.7.5 and the proposed TR 3.7.6.

Proposed TR 3.7.6, Condition C, addresses the condition where the required actions and completion times of Condition A or B are not met in Modes 1, 2, 3, or 4. For Condition A, the plant must be placed in a mode that minimizes plant risk. The proposed action requires that the plant be shutdown within 36 hours, consistent with the requirements of TS LCO 3.0.3 and with

current TS requirements for CREATCS. For Condition B, if one train cannot be restored within 12 hours, the required actions are to shutdown, consistent with the requirements of TS LCO 3.0.3. This action is also consistent with current TS requirements for CREATCS (two trains inoperable) which requires immediate entry into LCO 3.0.3.

Proposed TR 3.7.6, Condition D, addresses the condition where the required action and completion time of condition A is not met in Modes 5, or 6, or during movement of irradiated fuel. Actions are specified to immediately verify that the operable SDBR ACS train is in operation. This action ensures that the remaining train is OPERABLE and that no failures preventing automatic actuation have occurred, and is consistent with current TS requirements for CREATCS. If a failure of the standby train has occurred, the action assures that the failure is readily detected and that appropriate action is taken for two trains of SDBR ACS inoperable (Condition B). The completion time of immediate is consistent with the required times for actions requiring prompt attention.

Proposed TR 3.7.6, Condition E, addresses the condition where the required actions and completion times of Condition B are not met in Modes 5, or 6, or during movement of irradiated fuel. In this event, the affected electrical subsystem(s) made inoperable due to inoperable SDBR ACS, must be considered not OPERABLE and LCO 3.8.10, Condition A and applicable Required Actions entered immediately. The completion time of immediately is consistent with the required times for actions requiring prompt attention.

Proposed Technical Surveillance Requirement (TSR) 3.7.6.1
This TR also specifies a new Technical Surveillance Requirement (TSR) to verify that each SDBR ACS train has the capability to remove the required cooling load by verifying that measurable parameters have not degraded. The only measurable parameters that could degrade undetected during normal operation are the total air flow rates through each AHU and chilled water flow rate to each chiller. Verification of these two flow rates will provide assurance that the heat removal capacity of the system is still adequate. The frequency of this TSR is specified as 18 months and is similar to the CREATCS SR 3.7.11.1.

TR 3.7.7 - 480V Board Room Air Conditioning (AC) Systems

Design Function of 480V Board Room AC Systems

The 480 Volt Board Room air conditioning systems are primary safety related systems designed to maintain required temperatures and relative humidities for the 480 volt board rooms, 125 volt battery rooms (I, II, III, IV, and V), and associated mechanical equipment rooms on elevation 772.0 of the auxiliary building during both normal and post accident conditions. The design basis of the 480 Volt Board Room AC systems is to maintain the required temperatures in the rooms served for all modes of operation and for up to 100 days following certain DBEs. The 480V Board Room AC Systems are

considered as "attendant" equipment. The 480V Board Room AC Systems are described in UFSAR Section 9.4.3 and depicted in UFSAR Figure 9.4-15.

The 480V board rooms are separated into two sub-areas per reactor unit corresponding to Train A and Train B electrical power. Four separate air conditioning systems are provided, one to serve each of the four board room sub-areas, each consisting of a 480V board room and battery room. In addition, the 480V Board Room 1A AC system also provides cooling to the fifth vital battery room. The Train A board rooms contain only Train A equipment and are cooled by the Train A air conditioning systems, while the Train B board rooms contain both Train A electrical equipment (battery chargers and inverters) and Train B electrical equipment and are cooled by both Train A and Train B air conditioning systems. Each air conditioning system includes a direct expansion type split refrigeration system, consisting of a compressor, air handling unit (AHU), air cooled condensing unit, air supply distribution system, and control and safety devices. Because each sub-area is served by an attendant air conditioning system sized to remove 100% of the design cooling load within that sub-area, full redundancy is provided.

During normal and post accident operation, pressurizing fans supply outside air to maintain the 480 Volt Board Room areas at a slight positive pressure with respect to the outside and provide make-up air to each of the five vital battery rooms which prevents hydrogen accumulation within the rooms during battery charging. The pressurizing air supply fans and battery room exhaust fans operate independently of the AC systems, however, their continued operation during both normal and post accident conditions is assumed in conjunction with operation of 480V Board Room AC.

In automatic mode, temperatures in the 480V board rooms are controlled by thermostats located in the board rooms. This assures that the primary safety related electrical equipment located in the 480V board rooms function as required during and following a DBE.

Similar to the SDBR areas, existing TR 3.7.5 provides nominal temperature limits for the Elevation 772.0 480V Board Rooms. The TR provides a normal limit of 83°F for the 480V board rooms and imposes an abnormal limit of 104°F which if exceeded, requires restoring temperature to within limits or declaring affected equipment inoperable within four hours. These temperature limits ensure temperatures do not exceed IEEE standards for components in a mild environment, therefore the equipment in these areas is not subject to the requirements of the 10 CFR 50.49 Environmental Qualification Program. All of the rooms served by the 480V board room AC systems are classified as mild environments based on the WBN design criteria for environmental design. TVA does not anticipate a need to revise the limits or required actions of TR 3.7.5 as a result of the proposed change.

Proposed Specification - TR 3.7.7

The proposed TR provides operational guidance for coping with one, or more 480 Volt board room AC systems out of service. In Modes 1, 2, 3, 4, 5, and 6, and during movement of irradiated fuel assemblies, the 480 Volt Board Room AC systems must be OPERABLE to ensure that the 480 Volt Board Room area temperatures will not exceed electrical equipment operational requirements. The TR requires all four 480 Volt Board Room AC systems to be OPERABLE to ensure that at least two systems of a common train of cooling are available, assuming a single failure such as a loss of train power disables the opposite train systems. A loss of both trains of cooling per reactor unit could eventually result in exceeding the operating temperature limits for the electrical equipment served in those areas during a DBE. As discussed in the proposed Bases of TR 3.7.7, the 480 Volt Board Room AC systems are considered to be OPERABLE when the individual components in each of the four systems are OPERABLE. These components include refrigeration compressors, AHUs, air cooled condensing units, air supply distribution systems, and control and safety devices. In addition, the 480 Volt Board Room AC systems must be operable to the extent that air circulation can be maintained whenever the AHUs are operating. The pressurizing air supply fans and battery room exhaust fans operate independently of the AC systems, however, their hydrogen removal and air circulation capability is required to support continued operation when one or more of the 480 Volt Board Room AC systems are out of service.

Proposed TR 3.7.7, Condition A, addresses one or both 480V board room AC system(s) of the same train inoperable, or two systems of the opposite train and opposite unit inoperable. Figures are supplied to graphically depict the equipment combinations for this condition and illustrate acceptable air flow paths between rooms when compensatory ventilation fans are installed. The required action is to restore the system(s) to operable status within 30 days.

In this condition, the remaining combinations of OPERABLE 480 Volt Board Room AC systems will maintain room air temperatures within TR 3.7.5 temperature limits during full power operation if doors are opened and compensatory ventilation fans are installed to provide mixing of air between 480 Volt Board Rooms. Post-LOCA temperature limits, as defined in WBN Environmental Design Criteria, are also maintained based on WBN calculations. No credit is taken for operation of the compensatory fans during a DBE LOCA since these fans are not safety related. Continued operation of the pressurizing fans and battery room exhaust fans is required during this condition since these fans provide mixing of air between rooms and prevent the accumulation of hydrogen in the battery rooms. The overall reliability is reduced in this configuration because a postulated single failure of the remaining OPERABLE 480 Volt Board Room AC system serving the opposite train board room and of the same unit could eventually result in loss of 480 Volt Board Room equipment function.

Similar to TR 3.7.6 (SDBR ACS), the 30 day completion time for the 480V board room AC systems is based on similarity to CREATCS (addressed in TS 3.7.11) which allows 30 days to restore an inoperable CREATCS train. As with CREATCS, the 480 Volt Board Room AC systems have similar redundancy in that failure of one train of cooling will not preclude proper operation of either train of electrical equipment served during mitigation of a DBE.

Proposed TR 3.7.7, Figure 3.7.7-1, provides a graphical plan view of combinations of OPERABLE/INOPERABLE 480V board room AC systems acceptable for continued full power operation. Also depicted are the compensatory fan air flow directions between rooms necessary to maintain each within its normal temperature limit defined in TR 3.7.5. These configurations will promote adequate mixing of air between rooms and allow the OPERABLE air conditioning system(s) to cool both rooms. In each case, two portable fans (per door opening) are positioned on the floor such that one is inside the room with the INOPERABLE AC system and the other is inside the adjacent board room with OPERABLE AC. Portable fans, flexible duct, power cables, etc. are conveniently stored so that compensatory measures may be established promptly within expected time frames. Fire breaching permits are required prior to securing the required door in the open position. WBN instructions will specify these compensatory measures, including restoration time frames, selection of doorways, storage and placement of fans and associated flex duct, designated power supplies, etc.

The proposed TR requires that the portable fans be installed and running to ensure that the normal temperature limits of TR 3.7.5 are not exceeded. In the event this action is not accomplished, the requirements of TR 3.7.5 provide adequate measures for temperatures which exceed limits. Each portable fan pair would remain running until the associated INOPERABLE AC system is returned to service. Verification that at least one train of pressurizing fans and battery room exhaust fans per 480V board room remain OPERABLE is required within 12 hours. This 12 hour completion time is based on a review of battery room transient temperature profiles and is much less than the times associated with attaining a 2% hydrogen concentration within the battery rooms assuming no ventilation.

A Note has been added to exclude the MODE change restriction of TR 3.0.4 for Condition A. This exception allows entry into the applicable MODE (1 through 4) while relying on the ACTIONS even though the ACTIONS may eventually require unit shutdown. This exception is acceptable due to the low probability of an event requiring additional air conditioning systems.

Proposed TR 3.7.7, Condition B, addresses a condition where a second 480V board room AC System of the same unit becomes inoperable resulting in a complete loss of safety related cooling for areas served by 480V Board Room AC systems. In that event, air temperatures in some rooms could eventually reach, or exceed acceptable limits, therefore the proposed actions for Condition B require that at least one of the 480V board room AC systems must be restored to OPERABLE status within 12 hours.

The analysis for this condition is the same as that for the SDBR ACS, discussed previously. The transient temperature analysis again demonstrates that peak temperatures in each room served by the 480V board room AC Systems remain below the mild environment temperature limit of 130°F for a period of 24 hours assuming a complete loss of air conditioning to all rooms served by all four 480V board room AC Systems. As with the SDBR ACS, the analysis is bounding for normal operational conditions and accident conditions. Continued operation of one train of elevation 772.0 pressurizing fans and one train of 125 volt battery room exhaust fans is not a requirement of this analysis in consideration of the limited time frame. WBN calculations indicate hydrogen concentrations will not reach 2% by volume within 24 hours.

The 12 hour Completion Time serves to minimize exposure to an initiating event concurrent with both 480 V board room AC Systems inoperable. As discussed previously for TR 3.7.6, the 12-hour Completion Time is reasonable based on the low probability of occurrence of LOCA or SGTR initiating events during this brief outage time, and due to low contribution of these events leading to core damage and LERF.

For Condition B, a note requires that no more than one 480 volt board room AC system of the same unit may be made simultaneously inoperable on a pre-planned basis for maintenance, modifications, or testing, since Condition B is intended to address unforeseen circumstances. This further serves to minimize the likelihood of two 480 volt board room AC systems being inoperable concurrent with a DBE.

Similar to the SDBR ACS, the TR 3.7.5 104°F abnormal temperature limit for areas served by the 480V board room AC and the associated TR actions are considered sufficient and not expected to change. Based on predicted worst case temperatures during accident conditions, it is expected that most equipment restoration activities during normal operations could be accomplished within the applicable time limits of TR 3.7.5 and the proposed TR 3.7.7.

Proposed TR 3.7.7, Condition C, addresses the condition where the required actions and completion times of Condition A or B are not met in Modes 1, 2, 3, or 4. For Condition A, the plant must be placed in a mode that minimizes plant risk. The proposed action requires that the plant be shutdown within 36 hours, consistent with requirements of TS LCO 3.0.3 and with current TS requirements for CREATCS. For Condition B, if one system cannot be restored within 12 hours, the required actions are to shutdown, consistent with the requirements of TS LCO 3.0.3. This action is also consistent with current TS requirements for CREATCS (two trains inoperable) which requires immediate entry into LCO 3.0.3.

Proposed TR 3.7.7, Condition D, addresses the condition where the required actions and completion times of Conditions A and B are not met in Modes 5 or 6, or during movement of irradiated

fuel. In this event, the affected electrical subsystem(s) made inoperable due to inoperable 480V board room AC system(s), must be declared not OPERABLE and their applicable conditions and required actions in affected Technical Specifications entered immediately. These specifications include 3.8.5, "DC Sources - Shutdown," 3.8.8, "Inverters - Shutdown," and 3.8.10, "Distribution Systems - Shutdown." The completion time of immediately is consistent with the required times for actions requiring prompt attention. Note that for TR 3.7.7, Condition A, this action differs from the required actions for TR 3.7.6, Condition A, because each 480V board room area is only served by one 100% capacity system.

Proposed Technical Surveillance Requirement (TSR) 3.7.7.1
This TR also specifies a new TSR to verify that each 480 Volt AC system has the capability to remove the required cooling load by verifying that measurable parameters have not degraded. The only measurable parameters that could degrade undetected during normal operation are the total air flow rates through the AHUs and air cooled condensing units. Verification of these two flow rates will provide assurance that the heat removal capacity of the system is still adequate. The frequency of this TSR is specified as 18 months and is similar to the CREATCS SR 3.7.11.1.

FAILURE ANALYSIS

The proposed TR change was determined to require NRC approval in part, due to the affects of the change on the current assumptions stated in the UFSAR for the subject cooling systems. During the proposed 12 hour time period, the alignment of the air conditioning equipment wherein multiple AC trains or systems are disabled, effectively represents a change from the current design description in the FSAR. Namely, the automatic start-up of the standby system (in the case of the SDBR air conditioning system), or automatic start of the redundant 480V board room air conditioning system in response to reaching a thermostat set point has been delayed during this brief time period. This condition was determined to not significantly affect safe plant operations provided the limits of the proposed TR are satisfied.

WBN UFSAR, Tables 9.4-5 and 9.4-9, reflect the Failure Modes and Effects Analysis (FMEA) for each component associated with the SDBR and 480V board room air conditioning systems, respectively. Credit is taken in the SDBR evaluation for automatic start-up capability of the standby train upon low ΔP across the chilled water circulating pump, temperature greater than setpoint at the inlet to the air handling unit (AHU), or low air flow rate at the AHU for the assumed failed train. In the case of the FEMA for the 480V board room AC Systems, credit is taken for redundancy provided by the opposite train board room if one air conditioning system fails. None of the automatic control features or redundant systems credited in the current FMEAs are being deleted, modified, or otherwise replaced by operator actions as a result of the proposed change. These redundant features will remain available during the 30 day time limits

specified in Condition A of 3.7.6 and 3.7.7 assuming there is no occurrence of an additional single failure during this period.

The FMEA evaluations are based on entering into a postulated DBE with both trains of cooling available and then applying single failure rules to each component in the system. In general, single failure rules do not apply while in an LCO condition due, in part, to the low probability for equipment malfunctions coincident with accident initiators. Likewise, single failures may be excluded while in Condition A of TR 3.7.6 and 3.7.7. As discussed, the 30 day completion time of Condition A is reasonable based on its similarity to TS 3.7.11 (CREATCS) which allows 30 days to restore an inoperable CREATCS train to OPERABLE status. Further, due to the low probability of occurrence of events which could result in significant radiation dose or core damage during the 12 hour period proposed in Condition B of TR 3.7.6 and 3.7.7, the completion times are reasonable and do not significantly challenge plant safety.

TVA's evaluation for the proposed TR changes has not attempted to credit operator actions, within the FMEA, to repair one train of air conditioning assuming both trains were initially inoperable as in condition B of the TRs. This would be difficult to justify due to various equipment failures which could be postulated that could not be corrected within the proposed completion time of 12 hours. Therefore, the FMEAs are not being changed and none of the accidents currently evaluated in the UFSAR are considered adversely affected by the proposed TRs.

WBN OPERATING EXPERIENCE

SDBR ACS

Operating experience at WBN to date has demonstrated that a failure of both trains of SDBR air conditioning concurrently has not occurred and typically single train failures can be repaired within 12 hours. A review of the maintenance history and LCO entry history for the SDBR chillers identified the following types of functional failures, all of which are repairable within the proposed 12 hour time frame:

1	11/03/96	Chiller tripped due to low oil pressure due to low oil level in the oil reservoir.
2	11/21/96	Chiller tripped due to low oil pressure. Low oil pressure was due to a dirty oil filter.
3	2/07/97	Chiller tripped due to contacts on 3SBB relay being pitted.
4	7/27/97	Chiller tripped due to incorrect spring tension on contact fingers for 3SBB relay.
5	9/09/97	Chiller failed to start due to low oil pressure. Low oil pressure was due to a dirty oil filter.
6	12/27/97	Chiller tripped on high discharge pressure due to a failure of 2-TCV-067-0158-B to modulate ERCW flow properly.
7	1/15/98	Chiller tripped due to low oil pressure. Low oil pressure was due to a dirty oil filter.
8	3/30/98	Chiller tripped due to 1-TCV-067-0158-A failure to modulate Essential Raw Cooling Water (ERCW) flow properly.
9	12/17/98	Chiller tripped on high discharge pressure due to 2-TCV-067-0158-B failure to modulate ERCW flow properly.
10	12/17/98	Chiller failed to start due to low oil pressure. Low oil pressure was due to a dirty oil filter.
11	1/04/99	Chiller failed to start due to low oil pressure. Low oil pressure was due to a dirty oil filter.
12	4/29/99	Valve stem clevis arm on 1-TCV-67-0158-A slipped on valve stem causing misalignment between the clevis arm and hydramotor output shaft.
13	6/12/99	Chiller failed to start on low oil pressure following maintenance activity.
14	9/29/00	Chiller was found to be tripped on high oil/discharge temperature. ERCW supply header was isolated for strainer inspection without the cross tie valve open.

The failures addressed above have occurred since WBN began commercial operations. In that time, WBN has established aggressive performance improvement plans under the Maintenance Rule Program (a)(1) to increase the reliability of WBN air conditioning systems, including the SDBR ACS. These corrective actions have included increased monitoring, surveillance, and preventive maintenance of air conditioning components, establishing criteria for various parameters such as oil level and pressures, and hardware modifications and replacements. Detailed cause analyses, equipment trends, and various assessments continue to be used to measure the effectiveness of actions taken, with substantial reliability improvements having been achieved to date. The SDBR ACS is currently projected to return to (a)(2) status in early 2002.

480V BOARD ROOM AC SYSTEMS

Failures contributing to inoperability of the 480V board room AC systems include the following examples:

1	03/96	Air cooled condenser 2-COND-031-0289-B threw belts as a result of a degraded damper which caused the fan to operate in an unstable area of its performance curve.
2	08/96	Air cooled condenser 2-COND-031-0289-B threw belts due to a degraded compressor float valve which resulted in excessive cycling of the unit.
3	04/97	Compressor 1-COMP-31-447 tripped due to low charge.
4	03/98	Thrown belts on condensing unit 2-COND-31-289
5	12/98	Thrown belts on condensing unit 2-COND-31-289
6	02/99	Air handling unit 2-AHU-31-461 tripped due to breaker problem.
7	03/00	1B Compressor did not run with AHU due to pitted auxiliary contact switch in breaker compartment.

The above types of failures are also repairable within a 12 hour time frame. Failure of two 480V board room AC systems concurrently has occurred only once since commercial operation and is documented in WBPER 98-15451-000. In that case, the 2B 480V board room air cooled condenser failed with the 2A 480V board room AC system already in an inoperable status for a minor oil switch modification and routine preventive maintenance. Failure of the 2B 480V board room cooling was due to thrown belts on the 2-COND-031-0289-B air cooled condenser. Prompt actions were taken to return both air conditioning units to service within about three hours.

Although the WBN 480V Board Room AC System has not experienced Maintenance Rule (a)(1) status, a number of corrective action initiatives have been implemented resulting in improved reliability of the units. Improvements include preventive maintenance inspections, addition of high temperature cut-out switches, fan drive system modification to fixed pitch sheaves, etc.

IV. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TVA is submitting a request for an amendment to the Watts Bar Nuclear (WBN) Unit 1 Technical Requirements Manual (TRM), to add two new Sections, 3.7.6, "Shutdown Board Room (SDBR) Air Conditioning System (ACS)," and 3.7.7, "Elevation 772.0 480 Volt Board Room Air Conditioning (AC) Systems." Each specification provides specific actions and associated completion times for various out-of-service conditions associated with these safety-related air conditioning systems. New technical surveillance requirements are also included, as well as detailed Bases for the new Technical Requirements.

TVA has concluded that operation of WBN Unit 1 in accordance with the proposed change to the TRM does not involve a significant hazards consideration. TVA's conclusion is based on its evaluation, in accordance with 10 CFR 50.91(a)(1), of the three standards set forth in 10 CFR 50.92(c).

A. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed revision to the WBN Technical Requirements Manual (TRM) will provide formalized operational guidance for coping with partial or complete unavailability of shut down board room (SDBR) and 480V board room air conditioning (AC) equipment for limited periods of time. The change does not impact the frequency of an accident because failure of either the SDBR or the 480V board room AC systems is not an initiator of any accident scenario. The change does not modify any plant hardware including the air conditioning systems, and none of their automatic control features or redundant systems currently credited in failure analyses are being deleted, modified, or otherwise replaced by operator actions as a result of the proposed change.

The proposed TRM revision changes current plant operating practice and WBN Final Safety Analysis Assumptions (FSAR) assumptions by allowing continued power operation with both trains of SDBR air conditioning concurrently inoperable and two 480V board room AC systems of the same unit to be concurrently inoperable for a limited duration, up to 12 hours. This condition is acceptable based on the low probability of the occurrence of postulated accidents resulting in core damage concurrent with multiple inoperable systems or trains of cooling equipment during this timeframe, and based on analyses which demonstrate that peak temperatures in each room served by these systems remain below mild environment temperature limits during this time period. Consequently, there is no significant adverse impact on the ability of required safety-related electrical equipment to continue to operate and perform their required functions, during both normal operation and during design basis events. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

B. **The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.**

The proposed change does not modify any plant hardware including the subject air conditioning systems. The change provides specific operational guidance for coping with partial or complete unavailability of shut down board room and 480V board room air conditioning equipment. No new accident or event initiators are created by allowing multiple air conditioning systems to be unavailable for the limited time period of 12 hours. The supported electrical equipment remains capable of performing its intended function both during normal operations and post accident. Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

C. **The proposed amendment does not involve a significant reduction in a margin of safety.**

The proposed TRM revision changes current FSAR assumptions by allowing continued power operation with both trains of SDBR air conditioning concurrently inoperable and allowing two 480V board room air conditioning systems of the same unit to be inoperable for a limited duration, up to 12 hours. This condition does not significantly reduce the margin of safety due to the low probability of the occurrence of a postulated accident resulting in core damage concurrent with multiple inoperable systems or trains of cooling equipment during the limited time period. In addition, transient temperature analyses demonstrate that peak temperatures in each room served by these systems remain below mild environment temperature limits for a period of 24 hours assuming a complete loss of air conditioning to all rooms served by the SDBR and 480V board room AC systems concurrently. The analysis is bounding for normal operational conditions. Consequently, there is no significant adverse impact on the ability of required safety-related electrical equipment to continue to operate and perform their required functions during both normal operation and during design basis events. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

V. ENVIRONMENTAL IMPACT CONSIDERATION

The proposed change does not involve a significant hazards consideration, a significant change in the types of or significant increase in the amounts of any effluents that may be released offsite, or a significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

ENCLOSURE 2

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

PROPOSED TECHNICAL REQUIREMENTS MANUAL (TRM) CHANGE TRM-01-08
REVISED PAGES

I. AFFECTED PAGE LIST

TRM

3.7-31
3.7-32
3.7-33
3.7-34
3.7-35
3.7-36
3.7-37

TRM BASES

B 3.7-26
B 3.7-27
B 3.7-28
B 3.7-29
B 3.7-30
B 3.7-31
B 3.7-32
B 3.7-33
B 3.7-34
B 3.7-35

II. REVISED PAGES

ATTACHED

TR 3.7 PLANT SYSTEMS

TR 3.7.6 SHUTDOWN BOARD ROOM (SDBR) AIR CONDITIONING SYSTEM (ACS)

TR 3.7.6 Two SDBR ACS trains shall be OPERABLE

APPLICABILITY: MODES 1, 2, 3, 4, 5, and 6
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----------NOTE---------- TR 3.0.4 is not applicable. ---------- One SDBR ACS train inoperable.	A.1 Restore SDBR ACS train to OPERABLE status.	30 days
B. ----------NOTE---------- No more than one SDBR ACS train may be made inoperable on a pre-planned basis for maintenance, modifications, or testing. ---------- Two SDBR ACS trains inoperable.	B.1 Restore one train of SDBR ACS to OPERABLE status.	12 hours
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1, 2, 3, or 4.	C.1 Be in MODE 3. AND C.2 Be in MODE 5.	6 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A not met in MODE 5 or 6, or during movement of irradiated fuel assemblies.	D.1 Verify OPERABLE SDBR ACS train is in operation.	Immediately
E. Required Action and associated Completion Time of Condition B not met in MODE 5 or 6, or during movement of irradiated fuel assemblies.	E.1 Enter applicable Conditions and Required Actions of TS LCO 3.8.10, Distribution Systems - Shutdown," for electrical subsystems made inoperable due to inoperable SDBR ACS.	Immediately

TECHNICAL SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.7.6.1	Verify each SDBR ACS train has the capability to remove the required cooling load.	18 months

TR 3.7 PLANT SYSTEMS

TR 3.7.7 ELEVATION 772.0 480 VOLT BOARD ROOM AIR CONDITIONING (AC) SYSTEMS

TR 3.7.7 Four 480V Board Room AC Systems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, 4, 5, and 6
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. -------NOTE---------- TR 3.0.4 is not applicable. ---------- One or both 480V Board Room AC system(s) of the same train inoperable, or two 480V Board Room AC systems of the opposite train and unit inoperable (See Figure 3.7.7-1 for example combinations).	A.1.1	Open doors and install compensatory ventilation fans to provide air flow between rooms as depicted in Figure 3.7.7-1.	Prior to exceeding normal temperature limits specified in TR 3.7.5 for areas cooled by 480V board room AC system(s).
	OR		
	A.1.2	Comply with TR 3.7.5 for areas cooled by 480V board room AC system(s) which exceed temperature limits.	Immediately
	AND		
	A.2	Verify that one train of 125 volt battery room exhaust fans (per battery room) and one train of pressurizing air supply fans (per 480V board room) is OPERABLE.	12 hours
	AND		
	A.3	Restore 480V Board Room AC system(s) to OPERABLE status.	30 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. -------NOTE---------- No more than one 480V board room AC system per unit may be made inoperable on a pre-planned basis for maintenance, modification, or testing. ---------- Two 480V Board Room AC systems associated with the same unit inoperable, or, three or more 480V Board Room AC systems inoperable (See Figure 3.7.7-2 for example combinations).	B.1 Restore at least one 480V board room AC system per unit to OPERABLE status.	12 hours
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1, 2, 3, or 4.	C.1 Be in MODE 3 AND C.2 Be in MODE 5	6 hours 36 hours
D. Required Action and associated Completion Time of Condition A or B not met in MODE 5 or 6, or during movement of irradiated fuel assemblies.	D.1 Enter applicable conditions and required actions of affected Technical Specifications for electrical subsystems made inoperable due to inoperable 480V board room AC system(s).	Immediately

TECHNICAL SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
TSR 3.7.7.1	Verify each 480V AC system has the capability to remove the required cooling load.	18 months

Figure 3.7.7-1 (Condition A Combinations):

1.

BD RM 2B System (OPERABLE)	BD RM 1B System (OPERABLE)
BD RM 2A System (OPERABLE) ⇄	BD RM 1A System (**INOPERABLE**)

OR

2.

BD RM 2B System (OPERABLE)	BD RM 1B System (OPERABLE)
BD RM 2A System (**INOPERABLE**) ⇄	BD RM 1A System (OPERABLE)

OR

3.

BD RM 2B System (OPERABLE) ⇄	BD RM 1B System (**INOPERABLE**)
BD RM 2A System (OPERABLE)	BD RM 1A System (OPERABLE)

OR

4.

BD RM 2B System (**INOPERABLE**) ⇄	BD RM 1B System (OPERABLE)
BD RM 2A System (OPERABLE)	BD RM 1A System (OPERABLE)

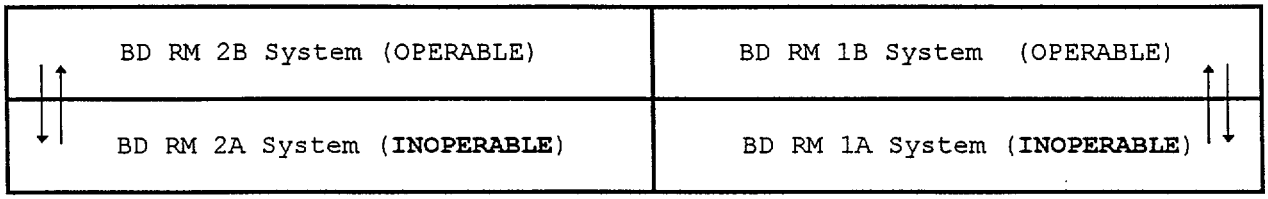
(continued)

Note: Figure 3.7.7-1 illustrates acceptable air flow paths between 480V board rooms when compensatory ventilation fans are installed. Each arrow represents a portable fan/flexible-duct assembly.

Figure 3.7.7-1 (Condition A Combinations) (continued):

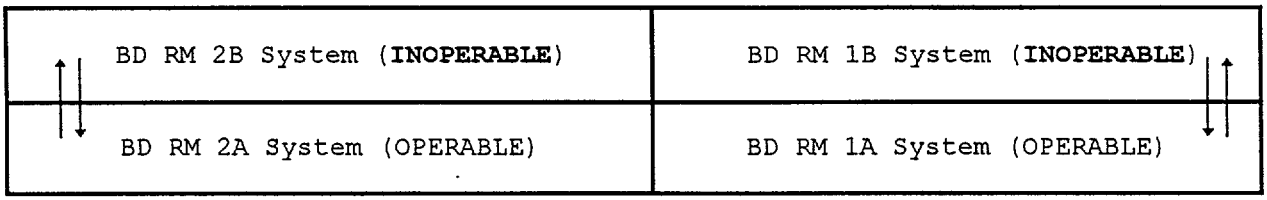
OR

5.



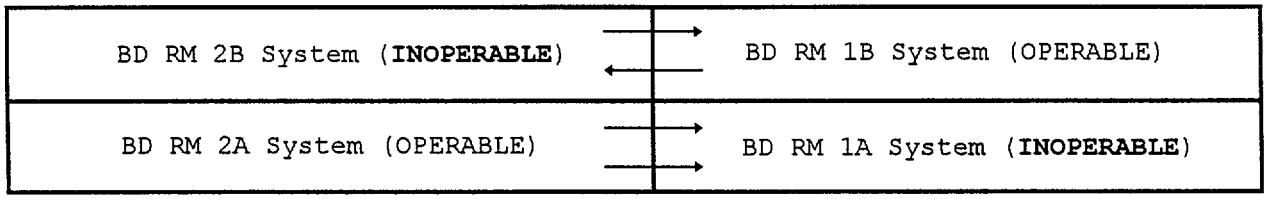
OR

6.



OR

7.



OR

8.

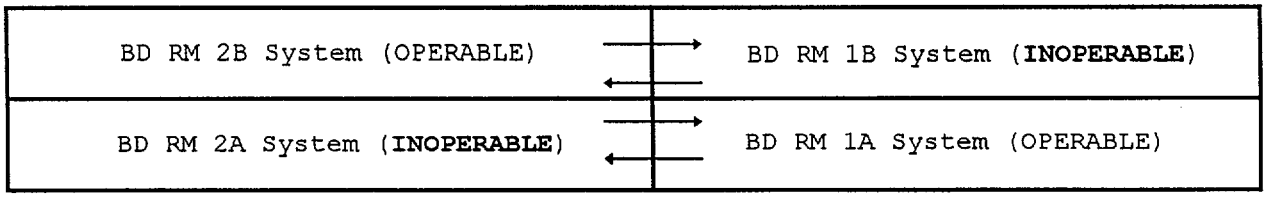


Figure 3.7.7-2 (Condition B Combinations):

1.

BD RM 2B System (OPERABLE)	BD RM 1B System (**INOPERABLE**)
BD RM 2A System (OPERABLE)	BD RM 1A System (**INOPERABLE**)

OR

2.

BD RM 2B System (**INOPERABLE**)	BD RM 1B System (OPERABLE)
BD RM 2A System (**INOPERABLE**)	BD RM 1A System (OPERABLE)

Note: Other valid Condition B combinations (not shown) include any 3 units inoperable or all 4 units inoperable.)

B 3.7 PLANT SYSTEMS

B 3.7.6 Shutdown Board Room (SDBR) Air Conditioning System (ACS)

BASES

BACKGROUND

The SDBR ACS is designed to maintain the temperatures and relative humidities as defined in Reference 1 for the SDBRs, auxiliary control room, auxiliary control instrument rooms, battery board rooms, and mechanical equipment rooms on elevation 757.0 of the auxiliary building during both normal and post accident conditions. This assures that the safety related electrical equipment in these areas function as required following a Design Basis Event (DBE). Therefore, the SDBR ACS is considered as "attendant" equipment.

The system consists of two 100% capacity redundant Air Handling Units (AHUs) per reactor unit (one in standby), a chilled water circulating pump and piping, and a chiller package which consists of a centrifugal compressor with a two section heat exchanger (evaporator and condenser). The condenser cooling water is supplied by the ERCW system. Normally, one chiller is in operation , while the opposite train is in standby mode. The unit in standby starts when the operating unit fails.

During normal operation, pressurizing fans supply outside air to maintain the SDBR areas at a slightly positive pressure with respect to the outside to ensure any air leakage is in the direction of areas of progressively greater contamination potential. The pressurizing fans operate independently of the ACS and are not within the scope of TR 3.7.6.

APPLICABLE SAFETY ANALYSIS

The design basis of the SDBR ACS is to maintain the required temperatures in the rooms served for all modes of operation and for up to 100 days following certain DBEs. The SDBR ACS is arranged in two redundant, safety related trains. A single active failure of a component of the SDBR ACS, with a loss of off-site power, does not impair the ability of the system to perform its design function. In the automatic mode, the redundant system will start if any of the following occurs:

- Low differential pressure across the chilled water circulation pump
- Low air flow measured at the outlet of either air handling unit fan
- A thermostat sensing temperature greater than the set point

The SDBR ACS is designed in accordance with seismic category I requirements. Each train of the SDBR ACS is capable of removing cooling loads which includes consideration of equipment, cables, lights, and transmission from surrounding spaces to ensure equipment operability.

(continued)

BASES (continued)

TR

TR 3.7.6 requires two independent and redundant trains of the SDBR ACS to be OPERABLE to ensure that at least one is available, assuming a single failure disabling the opposite train. Total system failure could eventually result in exceeding the operating temperature limits for the electrical equipment served in the SDBR areas during a DBE.

The SDBR ACS is considered to be OPERABLE when the individual components necessary to maintain the SDBR area temperatures are OPERABLE in both trains. These components include the chiller packages, chilled water pumps, AHUs, and associated temperature, differential pressure, and air flow control instrumentation. In addition, the SDBR ACS must be operable to the extent that air circulation can be maintained.

APPLICABILITY

In MODES 1, 2, 3, 4, 5, and 6, and during movement of irradiated fuel assemblies, the SDBR ACS must be OPERABLE to ensure that the SDBR area temperatures will not exceed electrical equipment operational requirements.

ACTIONS

A.1

With one SDBR ACS train inoperable, action must be taken to restore the SDBR ACS train to OPERABLE status within 30 days. In this condition, the remaining OPERABLE SDBR ACS train has 100% cooling capacity; therefore, no compensatory actions are necessary to maintain the required TR 3.7.5 area temperatures during continued full power operation. However, the overall reliability is reduced because a postulated single failure of the OPERABLE SDBR ACS could result in loss of SDBR function. The 30 day completion time is analogous to the Control Room Emergency Air Temperature Control System (CREATCS) which is operated in accordance with the requirements of Technical Specification (TS) 3.7.11 and allows 30 days to restore the inoperable CREATCS train to OPERABLE status prior to initiating unit shutdown. Similar to the SDBR ACS, the CREATCS also consists of two safety related AC trains, each with 100% cooling capacity. The SDBR ACS has similar redundancy in that failure of one train of cooling will not preclude proper operation of either train of electrical equipment served during mitigation of a DBE.

A Note has been added to exclude the MODE change restriction of TR 3.0.4 for Condition A. This exception allows entry into the applicable MODE (1 through 4) while relying on the ACTIONS even though the ACTIONS may eventually require unit shutdown. This exception is acceptable due to the low probability of an event requiring additional air conditioning systems.

(continued)

BASES

ACTIONS (continued)

B.1

In the event a second train of SDBR ACS becomes inoperable resulting in a complete loss of safety related cooling for the areas served by the SDBR ACS, air temperatures in some rooms could eventually reach, or exceed acceptable limits. Therefore, at least one train of the SDBR ACS must be restored to OPERABLE status within 12 hours. A transient temperature analysis (Reference 2) has demonstrated that peak temperatures in each room served by this ACS remain significantly below the mild environment temperature limit of 130°F for a period of 24 hours assuming a complete loss of air conditioning to all rooms served by the SDBR ACS. The analysis is bounding for normal operational conditions since it conservatively considers full LOCA cooling loads within each room, normal maximum (summer time) starting temperatures in each room, maximum LOCA surrounding room temperatures, and maximum design outside air temperatures including solar effects. The 12 hour Completion Time serves to minimize exposure to an initiating event concurrent with both ACS trains inoperable and as discussed in Reference 3, is reasonable based on the low probability of occurrence of events (LOCA and SGTR) which could result in significant radiation dose during this brief outage time.

A NOTE requires that no more than one SDBR ACS train may be made simultaneously inoperable on a pre-planned basis for maintenance, modifications, or testing, since Condition B is intended to address unforeseen circumstances. This serves to minimize the likelihood of two SDBR ACS trains being inoperable concurrent with a DBE.

C.1 and C.2

If the Required Action and associated Completion Time of Condition A is not met in MODES 1, 2, 3, or 4, the plant must be placed in a mode that minimizes the risk. To achieve this status, the plant must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours. Likewise, if the Required Action and associated Completion Time of Condition B is not met in MODE 1, 2, 3, or 4 (both SDBR ACS trains are inoperable for an extended period of time), then air temperatures in some rooms served by the SDBR ACS could reach, or exceed acceptable limits. Therefore, if one train cannot be returned to OPERABLE status within the required Completion Time, steps must be taken to place the unit in a safe MODE. To achieve this status, the plant must be in at least MODE 3 within 6 hours and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant condition from full power conditions in an orderly manner and without challenging plant systems.

(continued)

BASES

ACTIONS (continued)

D.1

In MODE 5 or 6, or during movement of irradiated fuel, if the inoperable SDBR ACS train cannot be restored within the required Completion Time, the OPERABLE SDBR ACS train must be verified to be in operation immediately. This action ensures that the remaining train is OPERABLE and that no failures preventing automatic actuation have occurred. If a failure of the standby train has occurred, the Required Action assures that the failure is readily detected and that appropriate action is taken for two trains of SDBR ACS inoperable (Condition B). The Completion Time of immediately is consistent with the required times for actions requiring prompt attention.

E.1

In MODE 5 or 6, or during movement of irradiated fuel assemblies, if one train of the SDBR ACS cannot be returned to service within the required Completion Time, then the affected electrical subsystems must be considered not OPERABLE and the applicable Conditions and Required Actions of LCO 3.8.10 entered immediately. The Completion Time of immediately is consistent with the required times for actions requiring prompt attention.

TECHNICAL SURVEILLANCE REQUIREMENTS

TSR 3.7.6.1

TSR 3.7.6.1 verifies that the heat removal capability of the system is sufficient to remove the required cooling load by verifying that measurable parameters have not degraded. The only measurable parameters that could degrade undetected during normal operation are the total air flow rates through each AHU and chilled water flow rate to each chiller. Verification of these two flow rates will provide assurance that the heat removal capacity of the system is still adequate. The 18 month frequency is appropriate since significant degradation of the SDBR ACS is slow and is not expected over this time period.

REFERENCES

1. WB-DC-40-42 Environmental Design Criteria

2. Calculation WBNOSG4-242, Rev. 1 "6.9KV and 480V Board Room Transient Temperature Analysis"

3. TVA letter to NRC, "WBN Unit 1 - TRM Change No. 01-08 - Addition of New Technical Requirements for Shutdown Board Room Air Conditioning (3.7.6) and 480 Volt Board Room Air Conditioning (3.7.7)," November 13, 2001.

B 3.7 PLANT SYSTEMS

B 3.7.7 480 Volt Board Room Air Conditioning (AC) Systems

BASES

BACKGROUND

The 480 Volt Board Room AC systems are designed to maintain the temperatures and relative humidities as defined in Reference 1 for each 480 volt board room, 125 volt vital battery rooms I, II, III, IV, and V, and associated mechanical equipment rooms on elevation 772.0 of the auxiliary building during both normal and post accident conditions. This assures that the safety related electrical equipment in these areas function as required following a Design Basis Event (DBE). Therefore, the 480 Volt Board Room AC systems are considered as "attendant" equipment.

The 480V board rooms are separated into two sub-areas per reactor unit corresponding to Train A and Train B electrical power. Four separate air conditioning systems are provided, one serving each of the four board room sub-areas, each consisting of a 480V board room and a 125V battery room. In addition, the 480V board room 1A AC system also provides cooling to the fifth vital battery room. The Train A board rooms contain only Train A equipment and are cooled by the Train A air conditioning systems, while the Train B 480V board rooms contain both Train A and Train B electrical equipment and are cooled by both Train A and Train B air conditioning systems. Train A cooling is supplied to cool Train A battery chargers and inverters located in the Train B board rooms, should a loss of Train B cooling occur. Each air conditioning system includes a direct expansion type split refrigeration system, consisting of a compressor, Air Handling Unit (AHU), air cooled condensing unit, air supply distribution system, and control and safety devices. In the automatic mode, temperatures in the 480V board rooms are controlled by thermostats located within the board rooms.

During normal and post accident operation, pressurizing fans supply outside air to maintain the 480 Volt Board Room areas at a slight positive pressure with respect to the outside and provide make-up air to each of the five vital battery rooms which prevents hydrogen accumulation within the rooms during battery charging. The pressurizing air supply fans and battery room exhaust fans operate independently of the AC systems, however, their continued operation during both normal and post accident conditions is assumed in support of the bases presented herein.

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSIS

The design basis for each 480V Board Room AC system is to maintain the required temperatures in the rooms served for all modes of operation and for up to 100 days following certain DBEs. Because each sub-area is served by an attendant air conditioning system sized to remove 100% of the design cooling load within that sub-area, full redundancy is provided. The 480 Volt Board Room AC systems are designed in accordance with seismic category I requirements. Each 480 Volt Board Room AC system is capable of removing cooling loads resulting from equipment, cables, lights, and transmission from surrounding spaces to ensure equipment operability.

TR

TR 3.7.7 requires all four 480 Volt Board Room AC systems to be OPERABLE to ensure that at least two systems of a common train of cooling are available, assuming a single failure such as a loss of train power disables the opposite train systems. A loss of both trains of cooling per reactor unit could eventually result in exceeding the operating temperature limits for the electrical equipment served in those areas during a DBE.

The 480 Volt Board Room AC systems are considered to be OPERABLE when the individual components necessary to maintain the 480 Volt Board Room area temperatures are OPERABLE in each of the four systems. These components include refrigeration compressors, AHUs, air cooled condensing units, air supply distribution systems, and control and safety devices. In addition, the 480 Volt Board Room AC systems must be operable to the extent that air circulation can be maintained whenever the AHUs are operating. The pressurizing air supply fans and battery room exhaust fans operate independently of the AC systems, however, their hydrogen removal and circulation capability is required to support continued operation when one or more of the 480 Volt Board Room AC systems are out of service.

APPLICABILITY

In MODES 1, 2, 3, 4, 5, and 6, and during movement of irradiated fuel assemblies, the 480 Volt Board Room AC systems must be OPERABLE to ensure that the 480 Volt Board Room area temperatures will not exceed electrical equipment operational requirements.

(continued)

BASES (continued)

ACTIONS

A.1, A.2, and A.3

With one or both 480 Volt Board Room AC system(s) of the same train inoperable, or both 480 Volt Board Room AC systems of the opposite train and unit inoperable, action must be taken to restore the system(s) to OPERABLE status within 30 days. In this condition, the remaining combinations of OPERABLE 480 Volt Board Room AC systems will maintain room air temperatures during full power operation within TR 3.7.5 limits if doors are opened and compensatory ventilation fans are installed to provide mixing of air between 480 Volt Board Rooms as depicted in Figure 3.7.7-1. Post LOCA temperature limits, as defined in Reference 1, are also maintained based on the results of Reference 2 without crediting operation of the compensatory fans since these fans are not safety related. Continued operation of the pressurizing fans and battery room exhaust fans is required to support the conclusions of References 2 and 3 during this condition since these fans provide some mixing of air between rooms and prevent the accumulation of hydrogen in the battery rooms.

The overall reliability is reduced in this configuration because a postulated single failure of the remaining OPERABLE 480 Volt Board Room AC system serving the opposite train board room and of the same unit could eventually result in loss of 480 Volt Board Room equipment function. The 30 day completion time is analogous to the Control Room Emergency Air Temperature Control System (CREATCS) which is operated in accordance with the requirements of Technical Specification (TS) 3.7.11 and allows 30 days to restore the inoperable CREATCS train to operable status prior to initiating unit shut down. Similar to the 480V Board Room AC systems, the CREATCS also consists of two safety related AC trains, each with 100% cooling capacity. The 480 Volt Board Room AC systems have similar redundancy in that failure of one train of cooling will not preclude proper operation of either train of electrical equipment served during mitigation of a DBE.

Figure 3.7.7-1 provides a graphical plan view of the acceptable combinations of operable/inoperable 480 volt board room AC systems for continued full power operation with compensatory ventilation fans installed. Also depicted are the compensatory fan air flow directions between rooms in order to maintain each within its normal temperature limit defined in TR 3.7.5. In each case, two portable fans (per door opening) must be positioned on the floor such that one is inside the room with the INOPERABLE AC system and the other is inside the adjacent board room with OPERABLE AC.

(continued)

BASES

ACTIONS

A.1, A.2, and A.3 (continued)

The portable fans should be installed and running to ensure that the normal temperature limits of TR 3.7.5 are not exceeded. In the event this action is not accomplished, the requirements of TR 3.7.5 provide adequate measures for temperatures which exceed limits. Each fan pair should remain running until the associated inoperable AC system is returned to service. Verification that at least one train of pressurizing fans and battery room exhaust fans per 480V board room is operable is required within 12 hours. This 12 hour completion time is based on a review of battery room transient temperature profiles of Reference 4, and as documented in Reference 5, is much less than the times associated with attaining a 2% hydrogen concentration within the battery rooms assuming no ventilation. Special instructions for these compensatory measures are provided in WBN procedure(s). Included are selection of doorways, storage and placement of fans and associated flex duct, and designated power supplies.

A Note has been added to exclude the MODE change restriction of TR 3.0.4 for Condition A. This exception allows entry into the applicable MODE (1 through 4) while relying on the ACTIONS even though the ACTIONS may eventually require unit shutdown. This exception is acceptable due to the low probability of an event requiring additional air conditioning systems.

B.1

In the event a second 480V board room AC system of the same unit becomes inoperable, (or three or more 480V AC systems become inoperable) resulting in a complete loss of safety related cooling to the rooms, air temperatures could eventually reach, or exceed acceptable limits. Therefore, at least one of the failed systems per unit must be restored to OPERABLE status within 12 hours. A transient temperature analysis (Reference 4) has demonstrated that peak temperatures in all rooms served by these systems remain significantly below the mild environment temperature limit of 130°F for a period of 24 hours assuming a complete loss of all air conditioning to all rooms served by the 480V Board Room AC systems concurrently. The analysis is bounding for normal operational conditions since it conservatively considers full LOCA cooling loads within each room, normal maximum (summer time) starting temperatures in each room, maximum LOCA surrounding room temperatures, and maximum design outside air temperatures including solar effects. Continued operation of one train of elevation 772.0 pressurizing fans and one train of 125 volt battery room exhaust fans is not a requirement of this analysis in consideration of the limited time frame. Hydrogen

(continued)

BASES

ACTIONS

B.1 (continued)

concentrations will not reach 2% by volume within 24 hours based on Reference 5.

The 12 hour Completion Time serves to minimize exposure to an initiating event concurrent with both 480 volt board room AC systems inoperable and as discussed in Reference 6, is reasonable based on the low probability of occurrence of events (LOCA and SGTR) which could result in significant radiation dose during this brief outage time.

A NOTE requires that no more than one 480 volt board room AC system may be made simultaneously inoperable on a pre-planned basis for maintenance, or testing, since Condition B is intended to address unforeseen circumstances. This serves to minimize the likelihood of two 480 volt board room AC systems of the same unit being inoperable concurrent with a DBE.

C.1 and C.2

If the Required Action and associated Completion Time of Condition A is not met in MODES 1, 2, 3, or 4, the plant must be placed in a mode that minimizes risk. To achieve this status, the plant must be placed in at least MODE 3 within 6 hours and in MODE 5 within 36 hours. Likewise, if the Required Action and associated Completion Time of Condition B is not met in MODE 1, 2, 3, or 4, then air temperatures in some rooms could reach, or exceed acceptable limits. Therefore, if one AC system per unit cannot be returned to OPERABLE status within the required Completion Time, steps must be taken to place the unit in a safe MODE. To achieve this status, the plant must be in at least MODE 3 within 6 hours and in MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant condition from full power conditions in an orderly manner and without challenging plant systems.

D.1

If the Required Action and associated Completion Time of Condition A or B is not met in MODES 5 or 6, then the affected electrical subsystems must be considered not OPERABLE and the affected Technical Specification Conditions and Required Actions for affected electrical equipment entered immediately. These specifications include 3.8.5, "DC Sources - Shutdown," 3.8.8, "Inverters - Shutdown," and 3.8.10, "Distribution Systems - Shutdown." The Completion Time of immediately is consistent with the required times for actions requiring prompt attention.

(continued)

BASES (continued)

TECHNICAL SURVEILLANCE REQUIREMENTS

TSR 3.7.7.1

TSR 3.7.7.1 verifies that the heat removal capability of the system is sufficient to remove the required cooling load by verifying that measurable parameters have not degraded. The only measurable parameters that could degrade undetected during normal operation are the total air flow rates through the AHUs and air cooled condensing units. Verification of these two flow rates will provide assurance that the heat removal capacity of the system is still adequate. The 18 month frequency is appropriate since significant degradation of the 480 Volt Board Room AC system is slow and is not expected over this time period.

REFERENCES

1. WB-DC-40-42 Environmental Design Criteria.

2. Calculation WBNOSG4-136, Rev. 13 "Steady State DBE LOCA Temperatures for the Auxiliary Building"

3. Calculation EPM-MMA-092989, Revisions 12 and 13 "Auxiliary Building Fan Static Pressure & Equipment Performance for 480V Board Rooms HVAC System."

4. Calculation WBNOSG4-242, Rev. 1 "6.9KV and 480V Board Room Transient Temperature Analysis"

5. Calculation EPM-RIU-112288, Rev. 6 "125V DC Vital Battery Rooms Ventilation"

6. TVA letter to NRC, "WBN Unit 1 - TRM Change No. 01-08 - Addition of New Technical Requirements for Shutdown Board Room Air Conditioning (3.7.6) and 480 Volt Board Room Air Conditioning (3.7.7)," November 13, 2001.