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

NOV 1 5 1999

TVA-WBN-TS-99-016 10 CFR 50.90

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

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - TECHNICAL SPECIFICATION (TS) CHANGE NO. 99-016 - ICE CONDENSER ICE SAMPLING AND ANALYSIS - SURVEILLANCE REQUIREMENT (SR) 3.6.11.5

In accordance with the provisions of 10 CFR 50.90, TVA is submitting a request for an amendment to WBN's license NPF-90 to change the Technical Specifications for Unit 1. The proposed amendment would (1) revise the WBN TS and associated TS Bases for SR 3.6.11.5 to change the methodology and frequency for sampling the ice condenser ice bed (stored ice), and (2) add a new TS SR 3.6.11.7 and associated TS Bases to address sampling requirements for all ice additions to the ice bed.

WBN is making this submittal as the lead plant for the WOG Ice Condenser Mini-group. A generic change to NUREG 1431 has recently been provided to NRC on the same subject as TSTF 356. As a result of WBN plant reviews, this submittal differs from the TSTF in that it contains an upper limit on ice boron concentration. A TSTF revision to incorporate the same information has been submitted to NEI with approval expected in the near future.

SR 3.6.11.5 is changed to (1) increase the sample population from nine representative samples to one randomly selected sample per ice condenser bay for a total of 24 samples, (2) add a note to clarify that acceptable performance of the SR is met provided the average results of the individual samples is within the existing (unchanged) acceptance criteria for boron concentration and pH, and (3) increases the performance frequency from 18 months to 54 months. New SR 3.6.11.7 requires that all ice additions to the ice condenser be sampled to verify they meet the boron and pH requirements of SR 3.6.11.5. A clarifying note allows samples to be obtained from either the liquid solution or the resulting ice.

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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 10CFR51.22(c)(9). The WBN Plant Operations Review Committee and the WBN Nuclear Safety Review Board have reviewed this proposed change, and 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 changes, including TVA's determination that the proposed change does not involve a significant hazards consideration, and its exemption from environmental review. Enclosure 2 contains copies of the appropriate TS and TS Bases pages from Unit 1 marked-up to show the proposed changes. Enclosure 3 forwards the revised TS pages for Unit 1, which incorporate the proposed change.

If you have any questions about this change or TSTF 356, please contact me at (423) 365-1824.

Sincerely,

P. L. Pace
Manager, Licensing and Industry Affairs

Enclosures
cc: See page 3

Subscribed and sworn to before me
on this 15th day of November, 1999.

E. Jeannette Long
Notary Public

My Commission Expires June 27, 2001

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cc (Enclosures):

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ENCLOSURE 1

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

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-99-016
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 Specifications (TS) and associated TS Bases for SR 3.6.11.5 to change the methodology and frequency for sampling the ice condenser ice bed (stored ice), and to add a new TS SR 3.6.11.7 to address sampling requirements for each ice additions to the ice bed.

Specifically, SR 3.6.11.5 currently requires that every 18 months ice in the ice bed be verified to have a boron concentration of $\geq$ 1800 ppm and a pH of $\geq$ 9.0 and $\leq$ 9.5, as determined by chemical analysis of nine representative ice samples. The proposed amendment increases the number of samples from nine to 24. The 24 samples are obtained by randomly selecting one ice basket to be sampled from each of the 24 ice bays. The acceptance criteria for boron concentration is changed to include an upper limit of 2000 ppm. A note is added to clarify that the SR requirements are satisfied if the boron concentration and pH values obtained from averaging the individual sample results are within the limits specified. The performance Frequency for SR 3.6.11.5 is increased from 18 months to 54 months.

New SR 3.6.11.7 requires that ice additions to the ice condenser be verified by chemical analysis to meet the boron concentration and pH requirements of SR 3.6.11.5. A note is provided to clarify that this verification can be performed by chemical analysis of either the liquid solution or the resulting ice.

II. REASON FOR THE PROPOSED CHANGE

Recent industry events related to the ice condenser prompted a review of related technical specifications. Through these reviews, differences were identified between each ice condenser plant's interpretation and implementation of the related technical specifications. Review of the differences regarding the ice sampling surveillance requirement led to the proposed changes, as agreed to by all ice condenser utilities. The proposed changes will provide additional assurance that TS and accident analysis assumptions are maintained, and will facilitate the regulatory oversight process at each ice condenser plant.

New SR 3.6.11.7 alone provides adequate assurance that the boron concentration and pH requirements of the ice are maintained. However, the industry has elected to retain a

modified version of SR 3.6.11.5 as added assurance that the stored ice maintains the required boron concentration and pH value, and to ensure no unexpected phenomena results in a chemical change in the ice.

III. SAFETY ANALYSIS

The ice condenser consists of over 2,403,800 lbs of ice stored in baskets within the ice condenser. Its primary purpose is to provide a large heat sink in the event of a release of energy from a loss of coolant accident (LOCA) or a high energy line break (HELB) in containment. The ice would absorb energy and limit containment peak pressure and temperature during the accident transient. Limiting the pressure and temperature reduces the release of fission product radioactivity from containment to the environment in the event of one of the above design basis accidents (DBAs).

Other functions of the ice bed and melted ice are to remove fission product iodine if released by the core, contribute inventory in the form of melted ice to the containment sump for recirculation mode core cooling, and minimize the occurrence of chloride and caustic stress corrosion of systems/components exposed to ECCS and Containment Spray fluids.

The proposed changes to SR 3.6.11.5 and the addition of SR 3.6.11.7 do not alter the above functions in any way, or the existing TS acceptance criteria for boron concentration or pH of the ice. Allowing acceptance criteria to be based on the averaged analysis results of the individual samples is consistent with the accident analysis assumption that the bulk containment sump pH and boron concentration will not be altered from their accident analysis assumed values following complete ice melt. Thus, application of the acceptance criteria to the analysis results of each sample is not required. Additionally, industry experience has shown that analysis results have rarely been outside the acceptance criteria. This is because pH remains in the specified range once boron concentration is above 1100-1200 ppm, and there are no normal operating mechanisms for the boron concentration to decrease. The few anomalies that have occurred were found to be very localized, not only in regards to adjacent baskets, but within the sampled basket itself. Often the problem was due to samples that contained clear ice as a result of ice scraping from doors. This, and the addition of SR 3.6.11.7 support changing the performance Frequency from 18 to 54 months, which is expected to be the equivalence of three fuel cycles. For newly added ice, there is no difference in sampling the liquid solution from which it is made, or the resultant ice.

IV. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TVA has concluded that operation of Watts Bar Nuclear Plant (WBN) Unit 1 in accordance with the proposed change to the Technical Specifications (TS) and TS Bases 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. <u>The Proposed Change Does Not Involve A Significant Increase In The Probability Or Consequences Of An Accident Previously Evaluated.</u>

The only analyzed accidents of possible consideration in regards to changes potentially affecting the ice condenser are a loss of coolant accident (LOCA) and a main steam line break (MSLB) inside containment. However, the ice condenser is not postulated as being the initiator of any LOCA or MSLB. This is because it is designed to remain functional following a design basis earthquake, and the ice condenser does not interconnect or interact with any systems that interconnect or interact with the reactor coolant or main steam systems. Since the proposed changes to the TS and TS Bases are solely to revise and provide clarification of the ice sampling and chemical analysis requirements, and are not the result of or require any physical change to the ice condenser, then there can be no change in the probability of an accident previously evaluated in the SAR.

In order for the consequences of any previously evaluated event to be changed, there would have to be a change in the ice condenser's physical operation during a LOCA or MSLB, or in the chemical composition of the stored ice. The proposed changes do not alter either from existing requirements, except to add an upper limit on boron concentration, which is the bounding value for the Hot Leg Switchover timing calculation. Though the Frequency of the existing surveillance requirement for sampling the stored ice is changed from once every 18 months to once every 54 months, the sampling requirements are strengthened overall with (1) the requirement to obtain one randomly selected sample from each ice condenser bay (24 total samples) rather than nine "representative" samples, and (2) the addition of a new surveillance requirement to verify each addition of ice meets the existing requirements for boron concentration and pH value. The only other change is to clarify that each sample of stored ice is individually analyzed for boron concentration and pH, but that the acceptance criteria for each parameter is based on the average values obtained for the 24 samples. This is consistent with the bases for the boron concentration of the ice, which is to ensure the accident analysis assumptions for containment sump pH and boron concentration are not altered following complete melting of the ice condenser. Historically, chemical analysis of the stored ice has had a very limited number of instances where an individual sample did not meet the boron or pH requirements, with all subsequent evaluations (follow up sampling) showing the ice condenser as a whole was well within these requirements. Requiring chemical analysis of each sample is provided to preclude the practice of melting all samples together before performing the analysis, and to ensure the licensee is alerted to any localized anomalies for investigation and resolution without the burden of entering a 24 hour ACTION Condition, provided the averaged results are acceptable. Thus, based on the above, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

B. The Proposed Change Does Not Create The Possibility Of A New Or Different Kind Of Accident From Any Accident Previously Evaluated

Because the TS and TS Bases changes do not involve any physical changes to the ice condenser, any physical or chemical changes to the ice contained therein, or make any changes in the operational or maintenance aspects of the ice condenser as required by the Tech Specs, there can be no new accidents created from those already identified and evaluated.

C. The Proposed Change Does Not Involve A Significant Reduction In A Margin Of Safety

The ice condenser Technical Specifications ensure that during a LOCA or SLB the ice condenser will initially pass sufficient air and steam mass to preclude over pressurizing lower containment, that it will absorb sufficient heat energy initially and over a prescribed time period to assist in precluding containment vessel failure, and that it will not alter the bulk containment sump pH and boron concentration assumed in the accident analysis. Since the proposed changes do not physically alter the ice condenser, but rather only serve to strengthen and clarify ice sampling and analysis requirements, the only area of potential concern is the effect these changes could have on bulk containment sump pH and boron concentration following ice melt. However, this is not affected because there is no change in the existing requirements for pH and boron concentration, except to add an upper limit on boron concentration. This upper limit is the bounding value for the Hot Leg Switchover timing calculation. Averaging the pH and boron values obtained from analysis of the individual samples taken is not a new practice, just one that was not consistently used by all ice condenser plants. Using the averaged values provides an equivalent bulk value for the ice condenser, which is consistent with the accident analysis for the bulk pH and boron concentration of the containment sump following ice melt. Changing the performance Frequency for sampling the stored ice does not reduce any margin of safety because (1) the newly proposed surveillance (SR 3.6.15.7) ensures ice additions meet the existing boron concentration and pH requirements, (2) there are no normal operating mechanisms, including sublimation, that reduce the ice condenser bulk pH and boron concentration, and (3) the number of required samples has been increased from nine to 24 (one randomly selected ice basket per bay), which is approximately the same number of samples that would have been taken in the same time period under the existing requirements. Thus, it can be concluded that the proposed TS and TS Bases changes do not involve a significant reduction in the 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 SPECIFICATION (TS) CHANGE TS-99-016
MARKED-UP PAGES

I. AFFECTED PAGE LIST

3.6-30
B 3.6-72
B 3.6-73

II. MARKED PAGES

3.6-30
~~B~~ 3.6-72
B 3.6-73

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.11.5 SEE INSERT A	~~Verify by chemical analysis of at least nine representative samples of stored ice~~: ~~a. Boron concentration is ≥ 1800 ppm;~~ and b. pH is ≥ 9.0 and ≤ 9.5.	54 ~~18~~ months
SR 3.6.11.6	Visually inspect, for detrimental structural wear, cracks, corrosion, or other damage, two ice baskets from each azimuthal group of bays. See SR 3.6.11.3.	40 months

SEE INSERT B FOR NEW SR 3.6.11.7

INSERT A

----------NOTE----------
The requirements of this SR are satisfied if the boron concentration and pH values obtained from averaging the individual sample results are within the limits specified below.

Verify, by chemical analysis of the stored ice in at least one randomly selected ice basket from each ice condenser bay, that ice bed:

a. Boron concentration is ≥ 1800 ppm and ≤ 2000 ppm;

INSERT B

SR 3.6.11.7	----------NOTE---------- The chemical analysis may be performed on either the liquid solution or on the resulting ice. --- Verify, by chemical analysis, that ice added to the ice condenser meets the boron concentration and pH requirements of SR 3.6.11.5.	Each ice addition

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.11.4 (continued)

ice/frost removal. These requirements are based on the sensitivity of the partial blockage analysis to additional blockage. The Frequency of 18 months was based on ice storage tests and the allowance built into the required ice mass over and above the mass assumed in the safety analyses.

SR 3.6.11.5

SEE INSERT C →

Verifying the chemical composition of the stored ice ensures that the stored ice has a boron concentration of at least 1800 ppm as sodium tetraborate and a high pH, ≥ 9.0 and ≤ 9.5, in order to meet the requirement for borated water when the melted ice is used in the ECCS recirculation mode of operation. ~~This is accomplished by obtaining at least nine representative ice samples. Representative samples are those taken approximately one foot from the top of each selected ice basket, with the selected baskets being distributed throughout the ice condenser. If the initial analysis results in an average pH value or an average boron concentration outside prescribed limits, then 55 additional randomly selected samples shall be analyzed. If either the average pH value or average boron concentration of the expanded sample is outside their prescribed limit(s), then entry into ACTION Condition A is required.~~ Sodium tetraborate has been proven effective in maintaining the boron content for long storage periods, and it also enhances the ability of the solution to remove and retain fission product iodine. The high pH is required to enhance the effectiveness of the ice and the melted ice in removing iodine from the containment atmosphere. This pH range also minimizes the occurrence of chloride and caustic stress corrosion on mechanical systems and components exposed to ECCS and Containment Spray System fluids in the recirculation mode of operation. The Frequency of ~~18 months~~ was developed considering these facts:

SEE INSERT D →

SEE INSERT E →

a. Long term ice storage tests have determined that the chemical composition of the stored ice is extremely stable;

SEE INSERT F →

c ~~b~~. Operating experience has demonstrated that meeting the boron concentration and pH requirements has never been a problem; and

d ~~c~~. Someone would have to enter the containment to take the sample, and, if the unit is at power, that person would receive a radiation dose.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.11.6

This SR ensures that a representative sampling of ice baskets, which are relatively thin walled, perforated cylinders, have not been degraded by wear, cracks, corrosion, or other damage. Each ice basket must be raised at least 10 feet for this inspection. However, for baskets where vertical lifting height is restricted due to overhead obstruction, a camera shall be used to perform the inspection. The Frequency of 40 months for a visual inspection of the structural soundness of the ice baskets is based on engineering judgment and considers such factors as the thickness of the basket walls relative to corrosion rates expected in their service environment and the results of the long term ice storage testing.

REFERENCES

1. Watts Bar FSAR, Section 6.2, "Containment Systems"
2. Title 10, Code of Federal Regulations, Part 50, Appendix K, "ECCS Evaluation Models"

SEE INSERT H

SEE INSERT G FOR NEW SR 3.6.11.7

(continued)

INSERT C

...≥ 1800 ppm and ≤ 2000 ppm...

INSERT D

Additionally, the minimum boron concentration setpoint is used to assure reactor subcriticality in a post LOCA environment, while the maximum boron concentration is used as the bounding value in the hot leg switchover timing calculation (Ref. 3). This is accomplished by obtaining at least 24 ice samples. Each sample is taken approximately one foot from the top of the ice of each randomly selected ice basket in each ice condenser bay. The SR is modified by a NOTE that allows the boron concentration and pH value obtained from averaging the individual samples' analysis results to satisfy the requirements of the SR. If either the average boron concentration or average pH value is outside their prescribed limit, then entry into ACTION Condition A is required.

INSERT E

. . . 54 months is intended to be consistent with the expected length of three fuel cycles, and . . .

INSERT F

b. There are no normal operating mechanisms that decrease the boron concentration of the stored ice, and pH remains within a 9.0-9.5 range when boron concentrations are above approximately 1200 ppm.

INSERT G

SR 3.6.11.7

This SR ensures that initial ice fill and any subsequent ice additions meet the boron concentration and pH requirements of SR 3.6.11.5. The SR is modified by a NOTE that allows the chemical analysis to be performed on either the liquid or resulting ice of each sodium tetraborate solution prepared. If ice is obtained from offsite sources, then chemical analysis data must be obtained for the ice supplied.

INSERT H

3. Westinghouse Letter, WAT-D-10686, "Upper Limit Ice Boron Concentration In Safety Analysis"

ENCLOSURE 3

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

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-99-016
REVISED PAGES

I. AFFECTED PAGE LIST

3.6-30
B 3.6-72
B 3.6-73

II. REVISED PAGES

3.6-30
B 3.6-72
B 3.6-73

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.6.11.5	----------NOTE---------- The requirements of this SR are satisfied if the boron concentration and pH values obtained from averaging the individual sample results are within the limits specified below. ---------- Verify, by chemical analysis of the stored ice in at least one randomly selected ice basket from each ice condenser bay, that ice bed: a. Boron concentration is ≥ 1800 ppm and ≤ 2000 ppm; and b. pH is ≥ 9.0 and ≤ 9.5.	54 months
SR 3.6.11.6	Visually inspect, for detrimental structural wear, cracks, corrosion, or other damage, two ice baskets from each azimuthal group of bays. See SR 3.6.11.3.	40 months
SR 3.6.11.7	----------NOTE---------- The chemical analysis may be performed on either the liquid solution or on the resulting ice. ---------- Verify, by chemical analysis, that ice added to the ice condenser meets the boron concentration and pH requirements of SR 3.6.11.5.	Each ice addition

SURVEILLANCE REQUIREMENTS

SR 3.6.15.4 (continued)

ice/frost removal. These requirements are based on the sensitivity of the partial blockage analysis to additional blockage. The Frequency of 9 months was based on ice storage tests and the allowance built into the required ice mass over and above the mass assumed in the safety analyses.

SR 3.6.15.5

Verifying the chemical composition of the stored ice ensures that the stored ice has a boron concentration of $\geq$ 1800 ppm and $\leq$ 2000 ppm as sodium tetraborate and a high pH, $\geq$ 9.0 and $\leq$ 9.5, in order to meet the requirement for borated water when the melted ice is used in the ECCS recirculation mode of operation. Additionally, the minimum boron concentration setpoint is used to assure reactor subcriticality in a post LOCA environment, while the maximum boron concentration is used as the bounding value in the hot leg switchover timing calculation (Ref. 3). This is accomplished by obtaining at least 24 ice samples. Each sample is taken approximately one foot from the top of the ice of each randomly selected ice basket in each ice condenser bay. The SR is modified by a NOTE that allows the boron concentration and pH value obtained from averaging the individual samples' analysis results to satisfy the requirements of the SR. If either the average boron concentration or the average pH value is outside their prescribed limit, then entry into ACTION Condition A is required. Sodium tetraborate has been proven effective in maintaining the boron content for long storage periods, and it also enhances the ability of the solution to remove and retain fission product iodine. The high pH is required to enhance the effectiveness of the ice and the melted ice in removing iodine from the containment atmosphere. This pH stress corrosion on mechanical systems and components exposed to ECCS and Containment Spray System fluids in the recirculation mode of operation. The Frequency of 54 months is intended to be consistent with the expected length of three fuel cycles, and was developed considering these facts:

a. Long term ice storage tests have determined that the chemical composition of the stored ice is extremely stable;

b. There are no normal operating mechanisms that decrease the boron concentration of the stored ice, and pH remains within a 9.0-9.5 range when boron concentrations are above approximately 1200 ppm.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.11.5 (continued)

c. Operating experience has demonstrated that meeting the boron concentration and pH requirements has never been a problem; and

d. Someone would have to enter the containment to take the sample, and, if the unit is at power, that person would receive a radiation dose.

SR 3.6.11.6

This SR ensures that a representative sampling of ice baskets, which are relatively thin walled, perforated cylinders, have not been degraded by wear, cracks, corrosion, or other damage. Each ice basket must be raised at least 10 feet for this inspection. However, for baskets where vertical lifting height is restricted due to overhead obstruction, a camera shall be used to perform the inspection. The Frequency of 40 months for a visual inspection of the structural soundness of the ice baskets is based on engineering judgment and considers such factors as the thickness of the basket walls relative to corrosion rates expected in their service environment and the results of the long term ice storage testing.

SR 3.6.11.7

This SR ensures that initial ice fill and any subsequent ice additions meet the boron concentration and pH requirements of SR 3.6.11.5. The SR is modified by a NOTE that allows the chemical analysis to be performed on either the liquid or resulting ice of each sodium tetraborate solution prepared. If ice is obtained from offsite sources, then chemical analysis data must be obtained for the ice supplied.

REFERENCES

1. Watts Bar FSAR, Section 6.2, "Containment Systems"

2. Title 10, Code of Federal Regulations, Part 50, Appendix K, "ECCS Evaluation Models"

3. Westinghouse Letter, WAT-D-10686, "Upper Limit Ice Boron Concentration In Safety Analysis"

(continued)