TVA

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

TVA-WBN-TS-01-09

SEP 0 7 2001

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. WBN-TS-01-09 - ICE CONDENSER ICE WEIGHT REDUCTION

In accordance with the provisions of 50.90, TVA is submitting a request for an amendment to WBN's license NPF-90 to change the TSs for Unit 1. The proposed change, WBN-TS-01-09, reduces the minimum TS ice basket weight of 1236 pounds to 1110 pounds, subsequently reducing the overall total ice weight limit from 2,403,800 pounds to 2,158,000 pounds.

Based upon the information presented in WCAP-15699, "Tennessee Valley Authority Watts Bar Nuclear Plant Unit 1 Containment Integrity Analyses for Ice Weight Optimization Engineering Report," Revision 1, dated August 2001 [Non-Proprietary], TVA concluded that the reduced ice weight is acceptable. The revised design basis analyses by Westinghouse Electric Company, using NRC approved modeling enhancements, has shown that the amount of ice required for accident mitigation may be reduced without decreasing safety margins.

The WBN proposed TS change is similar to TVA's Sequoyah Nuclear Plant Units 1 and 2 TS changes which were approved by NRC as Amendments 224 and 215, respectively, on June 10, 1997. Both the Sequoyah TS change and the proposed WBN change were performed by Westinghouse Electrical Company using the same NRC approved model for mass and energy release, WCAP-10325-P-A, "Westinghouse LOCA Mass and Energy Release Model for Containment Design - March 1979 Version."

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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 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 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. This includes TVA's determination that the proposed change does not involve a significant hazards consideration, and is exempt from environmental review. Enclosure 2 contains copies of the appropriate TS pages from Unit 1, marked-up to show the proposed change. Enclosure 3 forwards the revised TS pages for Unit 1 which incorporate the proposed change. Enclosure 4 provides a copy of the engineering topical report, WCAP-15699, Revision 1.

TVA requests approval for the reduced minimum ice weight approximately 30 days before the upcoming Cycle 4 Refueling Outage.

No commitments are being tracked from this submittal. 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 3

Subscribed and sworn to before me
on this 7th day of September 2001

E. Jeannette Long
Notary Public

My Commission Expires May 21, 2005

cc (Enclosures):

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ENCLOSURE 1

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

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE WBN-TS-01-09
DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

I. DESCRIPTION OF THE PROPOSED CHANGE

TVA proposes to revise the Watts Bar Nuclear Plant (WBN) Unit 1 Technical Specification (TS) Surveillance Requirements (SR) and the associated Bases to lower the minimum required average ice basket weight, and thus the corresponding total weight of the stored ice in the WBN ice condenser. In addition, the revised containment pressure analysis resulted in a change to the peak containment pressure.

The proposed changes affect the following sections:

1. TS Section 3.6.11, "Ice Bed," SR 3.6.11.2, SR 3.6.11.3, and the associated Bases are being revised to lower the minimum required average ice basket weight from 1236 pounds to 1110 pounds with a statement that the value does not account for instrument error, and the corresponding total weight of the stored ice in the ice condenser from 2,403,800 pounds to 2,158,000 pounds.

2. TS Bases Section 3.6.4, "Containment Pressure," is being revised to lower the peak containment pressure from 11.21 to 10.44 pounds per square inch gauge (psig) which resulted from the revised containment pressure analysis.

3. TS Bases Section 3.6.6, "Containment Spray Systems," is being revised to lower the peak containment pressure from 11.21 to 10.44 psig which resulted from the revised containment pressure analysis.

The specific changes to the TS and Bases are noted in the marked up copies of the applicable TS pages provided in Enclosure 2.

II. REASON FOR THE PROPOSED CHANGE

TVA is proposing to reduce the minimum TS ice basket weight requirements to reduce the expense of ice basket servicing. Since it is less difficult to maintain lower ice weights, TVA will be able to manage its maintenance manpower during outages more efficiently. TVA has revised the design basis analyses using a staff approved modeling enhancements. This analysis which was performed by Westinghouse Electrical Company, has shown that the amount of ice required for accident mitigation may be reduced without decreasing the required safety margins.

III. SAFETY ANALYSIS

TVA has evaluated those postulated design basis accidents that credit the ice condenser using the revised design basis analysis. The analysis provides assurance that containment heat removal capability is sufficient to remove the maximum possible discharge of mass and energy to containment without exceeding the containment pressure acceptance criteria. A summary of the design basis accidents is discussed in the following safety analysis.

Background

The ice bed consists of ice stored in 1944 baskets within the ice condenser. The primary purpose of the ice condenser is to provide a large heat sink in the event of a release of energy from a design basis loss-of-coolant (LOCA) or high energy line break (HELB) in containment. The LOCA requires the greatest amount of ice compared to other accident scenarios; therefore, the reduction in ice weight is based on the LOCA analysis. The amount of ice in the bed has no impact on the initiation of an accident, but rather on the mitigation of the accident.

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 a design basis accident. The design basis ice mass is supported by the containment integrity analysis documented in the WBN Updated Final Safety Analysis Report (UFSAR), Section 6.2, "Containment Systems." The technical specification surveillance limits on total ice weight, and on average basket ice weight by row-group, are intended to ensure that sufficient ice is present in an appropriate distribution to perform this function. The technical specification surveillance limits are currently an "as-left" measurement and include margin for ice sublimation and instrument tolerance.

Recently, LOCA long-term containment mass and energy release and containment integrity analyses have been performed to support ice weight optimization at WBN Unit 1. The objective of this effort was to provide revised containment mass and energy release data using current WBN specific information and more realistic models to support ice weight reduction. The analyses used the Westinghouse mass and energy release model documented in WCAP-10325-P-A, "Westinghouse LOCA Mass and Energy Release Model for Containment Design - March 1979 Version," May 1983 which was approved by NRC in a Safety Evaluation to Westinghouse dated February 17, 1987. This license amendment request is a first time application of this model to WBN. This model was used to reduce the minimum ice weight on TVA's Sequoyah Units 1 and 2, by License Amendments

224 and 215, respectively, dated June 10, 1997. In addition, this model has been used to perform analysis on other Westinghouse plants, e.g., the power uprate at Byron/Braidwood Nuclear Plants which was approved by NRC May 4, 2001.

The objective of the containment integrity analyses was to obtain ice weight optimization, retain the current time interval (approximately 150 seconds) relationship between containment spray switchover time and ice bed melt-out, and provide for peak pressure margin to design pressure. The results of the analysis support a design basis ice mass of 2,029,375 pounds (a reduction of approximately 4.5 percent from the current value). The revised Technical Specification limit of 2,158,000 pounds reflects this reduction, as well as a reduction in the sublimation rate. The proposed technical specification value does not account for instrument error. Instead, a margin for instrument error is added in the plant procedures for the proposed Technical Specification basket weight number. The revised sublimation rate is based on observations during the first three refueling cycles at WBN.

The analysis further demonstrates that the existing relationship between ice bed melt-out and containment spray switchover of approximately 150 seconds has been conservatively maintained. With the reduced ice inventory, melt-out of the ice bed following a worst case large break LOCA has been determined to occur at 178.5 seconds following the switchover of containment spray to the recirculation mode. Thus, the reduced ice bed mass does not result in a reduction in the margin for operator action to effect switchover.

Containment Integrity

Containment Integrity Analysis is performed during nuclear plant design to ensure that the pressure inside containment remains below the Containment Building design pressure in the event of a LOCA. The analysis ensures that the containment heat removal capability is sufficient to remove the maximum possible discharge of mass and energy to containment from the Nuclear Steam Supply System (NSSS) without exceeding the containment pressure acceptance criterion (13.5 psig).

WCAP-15699, "Tennessee Valley Authority Watts Bar Nuclear Plant Unit 1 Containment Integrity Analyses for Ice Weight Optimization Engineering Report," Revision 1,dated August 2001 [Enclosure 4], documents the WBN containment integrity analysis. That analysis uses revised input assumptions that eliminate analytical conservatism from the present analysis. The analysis provides the analytical basis for a reduction in the present WBN design basis ice mass of 2,125,000 pounds, with minimal impact on current margins in peak calculated containment pressure, and ice bed melt-out time to containment spray switchover time.

The WBN long-term LOCA mass and energy release calculations use the NRC approved Westinghouse state-of-the-art evaluation model for containment design. A key element in obtaining ice mass reduction is evaluating the energy released into containment in the event of a LOCA. Areas such as core stored energy, decay heat, and available steam generator metal heat were investigated, and available margins were implemented into the analysis. These margins, combined with a better segmental representation of the mass and energy release transient from the computer models, resulted in margins that reduced the assumed energy input into containment.

The LOCA mass and energy analysis was performed in accordance with the criteria shown in the Standard Review Plan (SRP), Section 6.2.1.3, "Mass and Energy Release Analysis for Postulated Loss-Of-Coolant Accidents." In this analysis, the relevant requirements of General Design Criteria (GDC) 50, "Containment Design Basis," and 10 CFR 50, Appendix K , "ECCS Evaluation Models," have been included by confirmation both that the calculated pressure is less than the WBN containment design pressure, and that the available sources of energy have been included. These sources include reactor power, decay heat, core stored energy, energy stored in the reactor vessel and internals, metal-water reaction energy, and stored energy in the secondary system.

In addition, the containment integrity peak pressure analysis has been performed in accordance with the criteria shown in SRP, Section 6.2.1.1.B, "Ice Condenser Containments." Conformance to GDC 16, "Containment Design," GDC 38, "Containment Heat Removal," and GDC 50, is demonstrated by showing that the containment design pressure is not exceeded at any time in the transient. This analysis also demonstrates that the containment heat removal systems function to rapidly reduce the containment pressure and temperature in the event of a LOCA.

Based on the information presented in WCAP-15699, Revision 1, it may be concluded that operation with a design basis ice weight of 2,029,375 pounds for the WBN Unit 1 is acceptable. Operation with a design basis ice mass of 2,029,375 pounds results in a calculated peak containment pressure (including the contribution due to non-condensable hydrogen) of 10.438 psig, as compared to the design pressure of 13.5 psig. Thus, the most limiting case in the WBN licensing basis accident analyses has been considered, and has been shown to yield acceptable results.

Main Steamline Break

The current main steamline break analysis for WBN shows that only 313,000 pounds of ice had melted by the time of peak pressure. Therefore the proposed reduction in total ice mass to 2,029,375 pounds would have no effect on the current analysis results, or its conclusions.

LOCA

There is no adverse impact on the LOCA peak clad temperature, (PCT) analyses. The short-term containment pressure calculation is relatively insensitive to the initial ice mass in the ice bed. At the time of peak cladding temperature, a relatively minor amount of ice would be melted and there would be a minor affect on containment pressure, and thus, a negligible effect on the calculated PCT. Therefore, no PCT penalty would be applied to the Best Estimate LOCA analysis result as a consequence of this amendment.

The post-LOCA subcriticality calculation conservatively assumes a maximum initial ice mass in the ice bed in order to minimize the sump boron concentration. Therefore, the reduction in ice inventory would have no effect on the calculation. The hot leg recirculation switchover time calculation, is performed to determine the time at which hot leg recirculation should be initiated in order to preclude boron precipitation in the core post-LOCA. This calculation assumes a minimum initial ice mass in the ice bed in order to conservatively maximize the boron concentration and result in a shorter switchover time. Reducing the ice weight would impact the calculated switchover time. However, the reduction in hot leg switchover time due to the reduced ice mass would be less than the margin between the calculated switchover time and the switchover time in the WBN emergency operating procedures (EOP). There would be no change to the hot leg switchover time in the EOPs as a consequence of this amendment. In addition, it has been determined that the minimum post-LOCA sump pH value will remain above 7.5. The sump pH above this value will not create a corrosion issue, and is acceptable with respect to minimizing the potential for chloride induced stress corrosion cracking and maintaining iodine retention in the sump solution. The sump pH change is the same as those proposed for the Tritium Program. The lower ice weight results in a reduction in pH and the Tritium Program increases the RWST boron concentration which further reduces the pH. The evaluation done for the Tritium Program included both effects and therefore, bounds the reduced ice weight when considered separately. [Reference TVA's letter dated August 20, 2001, concerning Technical Specification Change Request WBN-TS-00-015 for the Tritium Production Core.]

Finally, the results of this analysis bound the small break LOCA analysis with respect to the amount of ice mass melt.

Other Safety Related Analyses

The following analyses were also reviewed and determined not to be impacted by the proposed reduction in ice weight because the ice weight is not modeled in the analyses:

LOCA forces
Non-LOCA transients
Steam Generator Tube Rupture
Protection System Setpoints

Comparison of Basis for Ice Weight

The following table summarizes the differences in the current minimum allowable ice weight requirement and the proposed allowable ice weight requirement.

	Current*	Proposed
Design Basis Ice Mass	1093 lbs	1044 lbs
Added Sublimation Rate	12%	6%**
Added Instrument Error	1%	0%***
Total TS Basket Weight	1236 lbs.	1110 lbs.
Total TS Containment Ice Mass	2,403,800	2,158,000

* Approved for WBN Unit 1 by NRC in Amendment 2 dated June 13, 1996.

** Average sublimation over 3 operating cycles is approximately 3.4%.

*** TS value does not account for instrument error. A margin for instrument error is added in the plant procedures for proposed TS basket weight number.

IV. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TVA is submitting a request for an amendment to the Watts Bar Nuclear Plant (WBN) Unit 1 Technical Specification (TS) which would reduce the required minimum ice basket weight. TVA has revised the design basis analysis using NRC approved modeling enhancements, which show that the amount of ice required for accident mitigation may be reduced without decreasing safety margins. Decreasing the amount of required ice would reduce ice basket servicing activities.

TVA has concluded that operation of Watts Bar Nuclear Plant (WBN) Unit 1 in accordance with the proposed change to the technical specifications 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 primary purpose of the ice bed is to provide a large heat sink to limit peak containment pressure in the event of a release of energy from a design basis loss-of-coolant (LOCA) or high energy line break (HELB) in containment. The LOCA requires the greatest amount of ice compared to other accident scenarios, therefore the reduction in ice weight is based on the LOCA analysis.

The amount of ice in the bed has no impact on the initiation of an accident, but rather on the mitigation of the accident.

The containment integrity analysis shows that the proposed reduced ice weight is sufficient to maintain the peak containment pressure below the containment design pressure, and that the containment heat removal systems function to rapidly reduce the containment pressure and temperature in the event of a LOCA. Therefore, containment integrity is maintained and the consequences of an accident previously evaluated in the Updated Final Safety Analysis Report (UFSAR) are not significantly increased.

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

The ice condenser serves to limit the peak pressure inside containment following a LOCA. TVA has evaluated the revised containment pressure analysis and determined that sufficient ice would be present to maintain the peak containment pressure below the containment design pressure. Therefore, the reduced ice weight does not create the possibility of an accident that is different than any already evaluated in the WBN UFSAR. No new accident scenarios, failure mechanisms, or limiting single failures are introduced as a result of this proposed change.

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

The containment integrity analysis for reduced ice weight results in a peak containment pressure that is slightly lower than that in the previous analysis of record. This reduction in peak pressure, along with the ice weight reduction, is due to the removal of analytical conservatism combined with a better segmental representation of the mass and energy release transient from the computer models.

The revised technical specifications ice weight surveillance limits are based on the ice weight assumed in the containment integrity analysis, with margin included for sublimation that is based on actual sublimation data from the first three refueling cycles at WBN. The analysis further demonstrates that the existing relationship between ice bed melt-out and containment spray switchover has been conservatively maintained. With the reduced ice inventory, melt-out of the ice bed following a worst case large break LOCA has been determined to occur after the switchover of containment spray to the recirculation mode. Thus, the reduced ice bed mass does not result in a reduction in the margin for operator action to effect the switchover.

It may therefore, be concluded that the margin of safety is not significantly reduced.

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
Docket No. 50-390

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE WBN-TS-01-09
MARKED PAGES

I. AFFECTED PAGE LIST

Technical Specifications

3.6-29

Technical Specification Bases

B 3.6-28
B 3.6-37
B 3.6-65

II. MARKED PAGES

See attached.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.11.2 2,158,000	Verify total weight of stored ice is ≥ 2,403,800 lb by: a. Weighing a representative sample of ≥ 144 ice baskets and verifying each basket contains ≥ 1236 lb of ice; and b. Calculating total weight of stored ice, at a 95% confidence level, using all ice basket weights determined in SR 3.6.11.2.a.	18 months 1110
SR 3.6.11.3 1110	Verify azimuthal distribution of ice at a 95% confidence level by subdividing weights, as determined by SR 3.6.11.2.a, into the following groups: a. Group 1-bays 1 through 8; b. Group 2-bays 9 through 16; and c. Group 3-bays 17 through 24. The average ice weight of the sample baskets in each group from radial rows 1, 2, 4, 6, 8, and 9 shall be ≥ 1236 lb.	18 months
SR 3.6.11.4	Verify, by visual inspection, accumulation of ice on structural members comprising flow channels through the ice bed is ≤ 15 percent blockage of the total flow area for each safety analysis section.	18 months

(continued)

B 3.6 CONTAINMENT SYSTEMS

B 3.6.4 Containment Pressure

BASES

BACKGROUND

The containment pressure is limited during normal operation to preserve the initial conditions assumed in the accident analyses for a loss of coolant accident (LOCA) or steam line break (SLB). These limits also prevent the containment pressure from exceeding the containment design negative pressure differential (-2.0 psid) with respect to the shield building annulus atmosphere in the event of inadvertent actuation of the Containment Spray System or Air Return Fans.

Containment pressure is a process variable that is monitored and controlled. The containment pressure limits are derived from the input conditions used in the containment functional analyses and the containment structure external pressure analysis. Should operation occur outside these limits coincident with a Design Basis Accident (DBA), post accident containment pressures could exceed calculated values.

APPLICABLE SAFETY ANALYSES

Containment internal pressure is an initial condition used in the DBA analyses to establish the maximum peak containment internal pressure. The limiting DBAs considered, relative to containment pressure, are the LOCA and SLB, which are analyzed using computer pressure transients. The worst case LOCA generates larger mass and energy release than the worst case SLB. Thus, the LOCA event bounds the SLB event from the containment peak pressure standpoint (Ref. 1).

10.44

The initial pressure condition used in the containment analysis was 15.0 psia. This resulted in a maximum peak pressure from a LOCA of 11.21 psig. The containment analysis (Ref. 1) shows that the maximum allowable internal containment pressure, P_a (15.0 psig), bounds the calculated results from the limiting LOCA. The maximum containment pressure resulting from the worst case LOCA, does not exceed the containment design pressure, 13.5 psig.

(continued)

BASES

BACKGROUND (continued)	and water from a DBA. During the post blowdown period, the Air Return System (ARS) is automatically started. The ARS returns upper compartment air through the divider barrier to the lower compartment. This serves to equalize pressures in containment and to continue circulating heated air and steam through the ice condenser, where heat is removed by the remaining ice and by the Containment Spray System after the ice has melted. The Containment Spray System limits the temperature and pressure that could be expected following a DBA. Protection of containment integrity limits leakage of fission product radioactivity from containment to the environment.
APPLICABLE SAFETY ANALYSES	The limiting DBAs considered relative to containment OPERABILITY are the loss of coolant accident (LOCA) and the steam line break (SLB). The DBA LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients. No two DBAs are assumed to occur simultaneously or consecutively. The postulated DBAs are analyzed, in regard to containment ESF systems, assuming the loss of one ESF bus, which is the worst case single active failure, resulting in one train of the Containment Spray System, the RHR System, and the ARS being rendered inoperable (Ref. 2).
10.44	The DBA analyses show that the maximum peak containment pressure of 11.21 psig results from the LOCA analysis, and is calculated ~~to be~~ less than the containment design pressure. The maximum peak containment atmosphere temperature results from the SLB analysis. The calculated transient containment atmosphere temperatures are acceptable for the DBA SLB.

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B 3.6 CONTAINMENT SYSTEMS

B 3.6.11 Ice Bed

2,158,000

BASES

BACKGROUND

The ice bed consists of over 2,403,800 lbs of ice stored in 1944 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 Design Basis Accident (DBA) 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 a DBA.

The ice condenser is an annular compartment enclosing approximately 300° of the perimeter of the upper containment compartment, but penetrating the operating deck so that a portion extends into the lower containment compartment. The lower portion has a series of hinged doors exposed to the atmosphere of the lower containment compartment, which, for normal plant operation, are designed to remain closed. At the top of the ice condenser is another set of doors exposed to the atmosphere of the upper compartment, which also remain closed during normal plant operation. Intermediate deck doors, located below the top deck doors, form the floor of a plenum at the upper part of the ice condenser. These doors also remain closed during normal plant operation. The upper plenum area is used to facilitate surveillance and maintenance of the ice bed.

The ice baskets contain the ice within the ice condenser. The ice bed is considered to consist of the total volume from the bottom elevation of the ice baskets to the top elevation of the ice baskets. The ice baskets position the ice within the ice bed in an arrangement to promote heat transfer from steam to ice. This arrangement enhances the ice condenser's primary function of condensing steam and absorbing heat energy released to the containment during a DBA.

In the event of a DBA, the ice condenser inlet doors (located below the operating deck) open due to the pressure rise in the lower compartment. This allows

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.11.2

The weighing program is designed to obtain a representative sample of the ice baskets. The representative sample shall include 6 baskets from each of the 24 ice condenser bays and shall consist of one basket from radial rows 1, 2, 4, 6, 8, and 9. If no basket from a designated row can be obtained for weighing, a basket from the same row of an adjacent bay shall be weighed.

The rows chosen include the rows nearest the inside and outside walls of the ice condenser (rows 1 and 2, and 8 and 9, respectively), where heat transfer into the ice condenser is most likely to influence melting or sublimation. Verifying the total weight of ice ensures that there is adequate ice to absorb the required amount of energy to mitigate the DBAs.

1110

If a basket is found to contain < 1236 lb of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The average weight of ice in these 21 baskets (the discrepant basket and the 20 additional baskets) shall be ≥ 1236 lb at a 95% confidence level.

[Value does not account for instrument error.]

1110

1110

Weighing 20 additional baskets from the same bay in the event a Surveillance reveals that a single basket contains < 1236 lb ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a DBA transient, creating a path for steam to pass through the ice bed without being condensed. 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. Operating experience has verified that, with the 18 month Frequency, the weight requirements are maintained with no significant degradation between surveillances.

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ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT (WBN) UNIT 1
Docket No. 50-390

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE WBN-TS-01-09
REVISED PAGES

I. AFFECTED PAGE LIST

Technical Specifications

3.6-29

Technical Specification Bases

B 3.6-28
B 3.6-37
B 3.6-65

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.11.2	Verify total weight of stored ice is ≥ 2,158,000 lb by: a. Weighing a representative sample of ≥ 144 ice baskets and verifying each basket contains ≥ 1110 lb of ice; and b. Calculating total weight of stored ice, at a 95% confidence level, using all ice basket weights determined in SR 3.6.11.2.a.	18 months
SR 3.6.11.3	Verify azimuthal distribution of ice at a 95% confidence level by subdividing weights, as determined by SR 3.6.11.2.a, into the following groups: a. Group 1-bays 1 through 8; b. Group 2-bays 9 through 16; and c. Group 3-bays 17 through 24. The average ice weight of the sample baskets in each group from radial rows 1, 2, 4, 6, 8, and 9 shall be ≥ 1110 lb.	18 months
SR 3.6.11.4	Verify, by visual inspection, accumulation of ice on structural members comprising flow channels through the ice bed is ≤ 15 percent blockage of the total flow area for each safety analysis section.	18 months

(continued)

B 3.6 CONTAINMENT SYSTEMS

B 3.6.4 Containment Pressure

BASES

BACKGROUND

The containment pressure is limited during normal operation to preserve the initial conditions assumed in the accident analyses for a loss of coolant accident (LOCA) or steam line break (SLB). These limits also prevent the containment pressure from exceeding the containment design negative pressure differential (-2.0 psid) with respect to the shield building annulus atmosphere in the event of inadvertent actuation of the Containment Spray System or Air Return Fans.

Containment pressure is a process variable that is monitored and controlled. The containment pressure limits are derived from the input conditions used in the containment functional analyses and the containment structure external pressure analysis. Should operation occur outside these limits coincident with a Design Basis Accident (DBA), post accident containment pressures could exceed calculated values.

APPLICABLE SAFETY ANALYSES

Containment internal pressure is an initial condition used in the DBA analyses to establish the maximum peak containment internal pressure. The limiting DBAs considered, relative to containment pressure, are the LOCA and SLB, which are analyzed using computer pressure transients. The worst case LOCA generates larger mass and energy release than the worst case SLB. Thus, the LOCA event bounds the SLB event from the containment peak pressure standpoint (Ref. 1).

The initial pressure condition used in the containment analysis was 15.0 psia. This resulted in a maximum peak pressure from a LOCA of 10.44 psig. The containment analysis (Ref. 1) shows that the maximum allowable internal containment pressure, P_a (15.0 psig), bounds the calculated results from the limiting LOCA. The maximum containment pressure resulting from the worst case LOCA, does not exceed the containment design pressure, 13.5 psig.

(continued)

BASES

BACKGROUND (continued)

and water from a DBA. During the post blowdown period, the Air Return System (ARS) is automatically started. The ARS returns upper compartment air through the divider barrier to the lower compartment. This serves to equalize pressures in containment and to continue circulating heated air and steam through the ice condenser, where heat is removed by the remaining ice and by the Containment Spray System after the ice has melted.

The Containment Spray System limits the temperature and pressure that could be expected following a DBA. Protection of containment integrity limits leakage of fission product radioactivity from containment to the environment.

APPLICABLE SAFETY ANALYSES

The limiting DBAs considered relative to containment OPERABILITY are the loss of coolant accident (LOCA) and the steam line break (SLB). The DBA LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure and temperature transients. No two DBAs are assumed to occur simultaneously or consecutively. The postulated DBAs are analyzed, in regard to containment ESF systems, assuming the loss of one ESF bus, which is the worst case single active failure, resulting in one train of the Containment Spray System, the RHR System, and the ARS being rendered inoperable (Ref. 2).

The DBA analyses show that the maximum peak containment pressure of 10.44 psig results from the LOCA analysis, and is calculated to be less than the containment design pressure. The maximum peak containment atmosphere temperature results from the SLB analysis. The calculated transient containment atmosphere temperatures are acceptable for the DBA SLB.

(continued)

BASES

B 3.6 CONTAINMENT SYSTEMS

B 3.6.11 Ice Bed

BASES

BACKGROUND

The ice bed consists of over 2,158,000 lbs of ice stored in 1944 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 Design Basis Accident (DBA) 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 a DBA.

The ice condenser is an annular compartment enclosing approximately 300° of the perimeter of the upper containment compartment, but penetrating the operating deck so that a portion extends into the lower containment compartment. The lower portion has a series of hinged doors exposed to the atmosphere of the lower containment compartment, which, for normal plant operation, are designed to remain closed. At the top of the ice condenser is another set of doors exposed to the atmosphere of the upper compartment, which also remain closed during normal plant operation. Intermediate deck doors, located below the top deck doors, form the floor of a plenum at the upper part of the ice condenser. These doors also remain closed during normal plant operation. The upper plenum area is used to facilitate surveillance and maintenance of the ice bed.

The ice baskets contain the ice within the ice condenser. The ice bed is considered to consist of the total volume from the bottom elevation of the ice baskets to the top elevation of the ice baskets. The ice baskets position the ice within the ice bed in an arrangement to promote heat transfer from steam to ice. This arrangement enhances the ice condenser's primary function of condensing steam and absorbing heat energy released to the containment during a DBA.

In the event of a DBA, the ice condenser inlet doors (located below the operating deck) open due to the pressure rise in the lower compartment. This allows

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SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.11.2

The weighing program is designed to obtain a representative sample of the ice baskets. The representative sample shall include 6 baskets from each of the 24 ice condenser bays and shall consist of one basket from radial rows 1, 2, 4, 6, 8, and 9. If no basket from a designated row can be obtained for weighing, a basket from the same row of an adjacent bay shall be weighed.

The rows chosen include the rows nearest the inside and outside walls of the ice condenser (rows 1 and 2, and 8 and 9, respectively), where heat transfer into the ice condenser is most likely to influence melting or sublimation. Verifying the total weight of ice ensures that there is adequate ice to absorb the required amount of energy to mitigate the DBAs.

If a basket is found to contain < 1110 lb of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The average weight of ice in these 21 baskets (the discrepant basket and the 20 additional baskets) shall be ≥ 1110 lb at a 95% confidence level [Value does not account for instrument error.]

Weighing 20 additional baskets from the same bay in the event a Surveillance reveals that a single basket contains < 1110 lb ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a DBA transient, creating a path for steam to pass through the ice bed without being condensed. 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. Operating experience has verified that, with the 18 month Frequency, the weight requirements are maintained with no significant degradation between surveillances.

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ENCLOSURE 4

TS CHANGE WBN-TS-01-09

WCAP-15699, REVISION 1
WATTS BAR NUCLEAR PLANT UNIT 1
CONTAINMENT INTEGRITY ANALYSES FOR ICE WEIGHT
OPTIMIZATION ENGINEERING REPORT