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

September 19, 2008

10 CFR 50.59(c)(2)
10 CFR 50.90

TVA-WBN-TS-08-08

U.S. Nuclear Regulatory Commission
Mail Stop: OFWN P1-35
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - "LICENSE AMENDMENT REQUEST (LAR) TS-08-08 TO REVISE ICE CONDENSER LICENSING BASIS"

Pursuant to 10 CFR 50.90, Tennessee Valley Authority (TVA) is submitting a request for an amendment (TS-08-08) to License NPF-90 for WBN. The proposed change will modify the WBN Final Safety Analysis Report (FSAR) by requiring an inspection of the ice condenser within 24 hours of experiencing a seismic event greater than or equal to an Operating Basis Earthquake (OBE) within the five (5) week period after ice basket replenishment has been completed.

The intent of the proposed change is to confirm that adverse ice fallout has not occurred which could impede the ability of the ice condenser lower inlet doors to open. This action would be taken as a Staff-approved compensatory measure to ensure the qualification of the ice condenser containment design is maintained.

The proposed amendment provides a methodology to confirm the ice condenser maintains the ice condenser qualification as set forth in the FSAR. Justification for the use of the proposed methodology is based on reasonable assurance that the ice condenser lower inlet doors will open following a seismic event during the five week period and the low probability of a seismic event occurring coincident with or subsequently followed by a Design Basis Accident.

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TVA has determined that there are no significant hazards considerations associated with the proposed change and that the FSAR change qualifies for categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). 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.

TVA requests approval of this change by September 1, 2009 to support restart from the Cycle 9 refueling outage currently scheduled to begin in late September 2009. TVA requests a 45 day implementation period for the approved license amendment.

The FSAR revision was reviewed under the requirements of 10 CFR 50.59, "Changes, Tests, and Experiments." Based on this review, it was concluded that NRC review and approval is required in accordance with 10 CFR 50.59(c)(2).

Pending NRC approval, revisions to the WBN FSAR will be made in accordance with 10 CFR 50.71(e).

A listing of the regulatory commitment made in this submittal is provided in Attachment 1.

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 19th day of September, 2008.

Sincerely,

Michael K. Brandon
Manager, Site Licensing and
Industry Affairs

Enclosure:
Evaluation of the Proposed Change

cc: See page 3

Enclosure
cc (Enclosure):

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ENCLOSURE

EVALUATION OF THE PROPOSED CHANGE

Subject: Application for license amendment to revise Ice Condenser Licensing Basis to include requiring the inspection of the ice condenser within 24 hours of experiencing a seismic event greater than or equal to an Operating Basis Earthquake (OBE) within the five (5) week period after ice basket replenishment

1.0 SUMMARY DESCRIPTION

This evaluation supports a license amendment request (LAR) to amend Operating License NPF-90 for WBN Unit 1.

The proposed change would revise WBN's FSAR to require an inspection of the ice condenser within 24 hours of experiencing a seismic event greater than or equal to an Operating Basis Earthquake [OBE is defined as 1/2 of a Safe Shutdown Earthquake] within the five (5) week period after ice basket replenishment is completed. The 24 hour time frame for inspection is applicable during modes where the lower inlet doors are required to be operable; otherwise perform this inspection prior to startup. This will confirm that adverse ice fallout has not occurred which could impede the ability of the ice condenser lower inlet doors to open.

The proposed amendment provides a methodology to confirm the ice condenser maintains the ice condenser qualification as set forth in the FSAR. Justification for the use of the proposed methodology is based on reasonable assurance that the ice condenser lower inlet doors will open following a seismic event during the 5 week period and the low probability of a seismic event occurring coincident with or subsequently followed by a Design Basis Accident.

In 2007, an NRC Region III Inspector identified a potential concern that typical ice condenser maintenance practices at Donald C. Cook Nuclear Plant (CNP) do not ensure compliance with the licensing basis for ice fusion time requirements in that procedures do not recognize a five-week storage period for freshly loaded ice baskets prior to power ascension.

TVA's WBN began discussions with the other ice condenser plant licensees (CNP, Duke Power Company's Catawba (CNS) and McGuire (MNS) Nuclear Stations, and TVA's Sequoyah (SQN) Nuclear Plant) and Westinghouse regarding the ice fusion concern. The ice fusion issue was discussed in a public meeting at NRC Headquarters on December 12, 2007. Consistent with those discussions, TVA has elected to change the WBN FSAR as described above to address the ice fusion concerns.

2.0 DETAILED DESCRIPTION

The WBN ice condenser consists of a completely enclosed annular compartment located around 300 degrees of the perimeter of the upper compartment of the Containment, but penetrating the operating deck (also known as the divider barrier) so that a portion extends into the Containment lower compartment. The lower portion has a series of hinged doors (lower inlet doors) exposed to the atmosphere of the lower Containment compartment and designed to remain closed during normal plant operation. At the top of

the ice condenser is another set of doors (top deck blankets) that are exposed to the atmosphere of the upper compartment. These blankets also remain closed during normal plant operation. Intermediate deck doors are located below the top deck blankets. These doors form the floor of the upper ice condenser maintenance plenum of the ice condenser and remain closed during normal plant operation. Within the ice condenser, ice is held in baskets arranged to promote heat transfer to the ice. During normal plant operation, the ice condenser performs no function and is not required for a controlled shutdown of the unit.

The ice condenser is structurally designed to withstand a Safe Shutdown Earthquake plus a Design Basis Accident.

In the event of a loss-of-coolant accident (LOCA) or high energy line break (HELB), which includes a steam or feedwater line break inside Containment, the pressure rises in the lower compartment and the ice condenser lower inlet doors open. This allows a hot air and steam mixture to flow from the lower compartment into the ice condenser. The resulting pressure increase within the ice condenser causes the intermediate deck doors and the top deck blankets at the top of the ice condenser to open allowing the hot air and steam mixture to flow out of the ice condenser into the upper compartment. Steam entering the ice condenser is condensed by the ice, thus limiting the peak pressure and temperature buildup in containment. Condensation of steam within the ice condenser allows a continual flow of steam from the lower compartment to the condensing surface of the ice, thus reducing the containment pressure.

Sufficient ice heat transfer surface and flow passages through the ice bed are provided in the ice condenser so that the magnitude of the pressure transient resulting from an accident does not exceed the containment design pressure. The lattice frame assemblies allow passage of steam and hot air through the space around the ice baskets.

The floor drains are passive structural components during normal operation. During a small pipe break, the condensed steam and melted ice will collect on the floor of the ice condenser and then flow out through the small bore piping routed from the floor drains to the Reactor Building Floor and Equipment Drain Sump. For intermediate and large pipe breaks, water will drain through both the lower inlet doors and the drains and spray into the lower compartment for collection in the Containment Recirculation sump.

The lower inlet doors are provided with air boxes (shock absorber assemblies) to dissipate the kinetic energy generated by opening the doors during a large pipe break scenario to prevent damage to the lower inlet doors which would cause debris generation and possible adverse effects to the Containment Sump and screens.

As part of the ice condenser qualification program, seismic testing of ice baskets was conducted at the Westinghouse Waltz Mill facility to determine the amount of ice fallout from ice baskets subjected to simulated plant time history seismic disturbances.

Ice condenser qualification program test results were reported in WCAP-8110, "Test Plans and Results for the Ice Condenser System," and ten supplements. Supplement 9 to the WCAP, entitled "Ice Fallout from Seismic Testing of Fused Ice Basket," addresses ice retention during a seismic event.

This document describes the test apparatus and methodology for verifying that flake ice will be retained in an ice basket subjected to cumulative worst-case Safe Shutdown

Earthquake seismic loading. In the Atomic Energy Commission's [AEC (now NRC)] evaluation of WCAP-8110, Supplement 9, dated Nov 21, 1974, [renamed WCAP-8110, Supplement 9-A] it is stated that a flake ice basket stored for at least five weeks exhibited adequate retention capability when subjected to Design Basis [Safe Shutdown] Earthquake seismic response spectra.

The AEC's November 21, 1974 letter, included within WCAP-8110, Supplement 9-A, contains the following statement: "As a result of our review, we have concluded that the data presented in WCAP-8110 Supplement 9 [the Westinghouse test report] are adequate to conclude that land-based plants using ice condenser type containments should begin their initial ascent to power after a minimum of five weeks following ice loading." The same November 21, 1974 letter accepts the document as a topical report which may be referenced in license applications. WBN's FSAR references WCAP-8110, Supplement 9-A as part of the qualification of the ice condenser containment design.

The term "ice fusion" refers to a condition established when an ice basket freshly loaded with flake ice achieves stability at the operating temperature of the ice condenser, i.e., when the ice freezes or otherwise solidifies such that it tends to stay in the ice basket when agitated. If the ice were not sufficiently fused during a seismic event, it is possible that ice could fall from the ice baskets and impede the ability of the ice condenser lower inlet doors to open.

In order for the ice condenser to perform its energy absorption and pressure mitigation functions, the ice condenser lower inlet doors must open to allow the mass release from a high energy line break to enter the ice condenser, and the ice bed ice mass and geometry must be adequate to support heat transfer to the ice bed.

3.0 TECHNICAL EVALUATION

10 CFR 50.59(a)(6) defines a test or experiment not described in the Final Safety Analysis Report to mean any activity where a structure, system, or component is utilized or controlled in a manner which is either: (i) outside the reference bounds of the design bases as described in the FSAR, or (ii) inconsistent with the analyses or descriptions in the FSAR.

In this case, the reference bounds of the design bases are incorporated by reference to WCAP 8110, Supplement 9-A in the WBN FSAR. The reference bounds of the design bases is: "land-based plants using ice condenser type containments should begin their initial ascent to power after a minimum of five weeks following ice loading." This bounding waiting period assures that ice in the ice baskets will be sufficiently fused such that ice fall out during a Safe Shutdown Earthquake does not impede the ice condenser's design function while the plant shuts down. For seismic events equal to or less than a Safe Shutdown Earthquake, adequate retention of ice in the baskets is ensured by the current design bases. The activity to be analyzed is the ability for the WBN Unit to start an ascent to power operations without waiting for the bounding five week period if an alternate method of meeting the requirement is utilized.

10 CFR 50.59 (c)(1) states, in part, that the licensee may make changes to the licensed facility as described in the FSAR and conduct tests and experiments not described in the FSAR without obtaining a license amendment only if the changed test or experiment does not meet the criteria in paragraph (c)(2) of this section.

10 CFR 50.59 (c)(2) states, in part, that the licensee shall obtain a license amendment pursuant to 10 CFR 50.90 prior to implementing a proposed test or experiment which would: (ii) result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component important to safety previously evaluated in the UFSAR; or (viii) result in a departure from a method of evaluation described in the UFSAR used in establishing the design basis or in the safety analyses.

A review of the activity showed that the criterion for a license amendment submittal was met. Thus, a request for an alternate means of meeting the requirements is described below:

The current text of the WBN FSAR, Section 6.7.8.1, entitled "Lower Inlet Doors, Design Basis, Interface Requirements," reads as follows:

> Sufficient clearance is required for doors to open into the ice condenser. Items to be considered in this interface are floor clearance, lower support, structure clearance and floor drain operation and sufficient clearance (approximately six inches) to accommodate ice fallout in the event of a seismic disturbance occurring coincident with a LOCA.

The proposed revision to this paragraph reads as follows:

> Original ice basket qualification testing (Topical Report WCAP-8110, Supplement 9-A) has shown freshly loaded ice is considered fused after five weeks. In the event of an earthquake (OBE or greater) which occurs within five weeks following the completion of ice basket replenishment, plant procedures require a visual inspection of applicable areas of the ice condenser within 24 hours to confirm that opening of the ice condenser lower inlet doors is not impeded by any ice fallout resulting from the seismic disturbance. The 24 hour time frame for inspection is applicable during modes where the lower inlet doors are required to be operable; otherwise perform this inspection prior to startup. This alternative method of compliance with the requirements of GDC 2 is credible based upon the reasonable assurance that the ice condenser doors will open following a seismic event during the 5 week period and the low probability of a seismic event occurring coincident with or subsequently followed by a Design Basis Accident.

Under the proposed change to the licensing basis, power ascension and normal plant operation could occur for a period of up to five weeks prior to achieving full qualification of the ice condenser as defined in the current licensing basis. One of five scenarios could occur during this "period of potential exposure," specifically:

i. No seismic disturbance, LOCA, or HELB occurs

ii. A seismic disturbance occurs without a LOCA or HELB occurring

iii. LOCA or HELB occurs without a seismic disturbance

iv. A seismic disturbance occurs coincident with a LOCA or HELB

v. A seismic disturbance occurs with a subsequent LOCA or HELB

Under the first three scenarios, there is no impact as a result of the proposed change. In the first two scenarios, the ice condenser would not be called upon to perform an accident mitigation function. In the third scenario, although the ice condenser would be

called upon to mitigate an accident, absent a seismic disturbance, there is no driver to dislodge ice, and the ice condenser would function as designed.

In the fourth and fifth scenarios, if a LOCA or HELB occurred coincident with, or subsequent to a seismic disturbance, it is possible that ice in freshly loaded ice baskets could fall out. However, several factors provide defense-in-depth and tend to mitigate the safety significance of the proposed change:

- There is Reasonable Assurance That the Ice Condenser Would Function Following a Seismic Event

  Reduction in total ice mass:

  The basis of the current five-week ice fusion time requirement was derived from qualification testing (c. 1974) conducted by Westinghouse during development and licensing of ice condenser Containments. Determination of a minimum ice fusion time was not an objective of the test program.

  As a result of the review of test results captured in WCAP 8110, Supplement 9, the Ice Condenser Utility Group (American Electric Power Company (AEP), TVA, and Duke) concluded that the five-week ice fusion time selected as the licensing basis was conservative and that ice condenser design has substantial margin with respect to ice fallout. A key consideration in reaching this conclusion was inherent conservatisms in the 1974 test program:

  - The test baskets floated freely in the lattice frames and were not fixed at one end. The floating end exacerbates the movement resulting from application of a given seismic excitation, which would tend to overstate the ice fallout in the test compared to expected fallout from an actual plant event.
  - The test basket was only six feet tall and had an open top, whereas an actual ice condenser basket at WBN typically consists of four vertically stacked 12-foot sections, with only the uppermost section having an open top. The majority of ice fallout during the tests occurred from the open top of the basket where it spilled out from the top 12-inches through the open top. Since proportionally less ice would be expected to fall out of the lower three sections of an actual ice condenser basket, the percentage of ice falling out of the test basket section overstates what would be expected during an actual plant event. The acceptance criteria for this initial testing was to verify that no more than 1% of the ice mass exited the basket during a seismic event.
  - In addition to the conservatisms built into the 1974 test program, there is additional conservatism provided by the WBN ice basket maintenance practice. The practice used is to add ice to the voids in the lower portions of the baskets by a thermal drilling process rather than to fully empty and reload baskets. The amount of fresh ice added to any individual basket during servicing is typically 10-20 percent of the amount required for a complete basket fill. As such, there is significantly less "loose" ice in a

serviced basket than the configuration tested. Therefore the likelihood of any substantial ice fallout from these baskets is minimal.

Flow channel blockage:

The successful completion of WBN Technical Specification Surveillance Requirement 3.6.11.4 verifies that the ice accumulation on the structural steel members comprising flow channels through the ice bed is less than or equal to a 15% blockage of the total flow area for each safety analysis section.

Therefore, it can be reasonably assumed that any loose, granular ice that would be shaken free during a seismic event from a recently replenished ice basket cannot block flow passages that were verified to be at least 85% clear during the preceding surveillance inspection. It should be noted that plant procedures require the as-left flow blockage to be less than or equal to 10% in each bay.

Restriction of lower inlet door movement:

A total of 48 Lower Inlet Doors (2 per bay) exist in the Ice Condenser. Of these, it is reasonable to assume that in the event of a seismic event, only a small portion of these doors would be obstructed from fully opening. Based upon a review of the ice servicing history for WBN Unit 1, the average mass added to a serviced basket is currently approximately 200 pounds and the average number of baskets serviced per bay is approximately 20-25 baskets. Assuming a 100% ice fallout from the serviced baskets, ice approximately two-feet high (approximately 18 inches above the door threshold) would exist between the lower inlet doors and the floor-mounted turning vanes. As the initial testing as specified in WCAP-8110, Supplement 9-A was to verify no more than 1% ice mass was lost during a seismic event, it is excessively conservative to assume 100% fallout of the serviced ice. Therefore, an assumption of 33% ice fallout will be used. In the event that 33% of the new ice added to the baskets during servicing were to fall out, the resulting level of ice in the floor should not exceed more than approximately eight inches. The lower inlet doors may be partially obstructed from fully opening, but should continue to open to a lesser degree and the opening force on the door would relocate the ice immediately behind the doors to a point beyond the floor-mounted turning vanes. The hot air and steam mixture plus melt water would quickly remove the ice that had fallen from the baskets to the floor. The number of Lower Inlet Doors in the ice condenser coupled with the conservative assumption that 33% of the ice loaded into a serviced basket would fallout during a seismic event provides reasonable assurance that the ice condenser would perform its function even if some lower inlet doors were partially degraded.

Floor drain blockage:

As discussed in the WBN FSAR, Containment peak pressure is not affected by drain performance. There are a total of 20 ice condenser floor

drains among the 24 ice condenser bays. The ice condenser design is such that for blockage of any floor drain, water would flow to adjacent bays and eventually would spill over the lower inlet door openings if necessary. Additionally, any ice on the floor of the ice condenser would be melted by the rise in temperature of the ice condenser, the recirculation of the hot air and steam mixture through the ice bed (lower inlet doors), and flowing melt water.

In conclusion, there is reasonable assurance that the ice condenser would function properly following a seismic event within the 5 week period due to inherent conservatisms in the 1974 test data, the low likelihood of flow channel and floor drain blockage, and improbable blocking of the Lower Inlet Doors by any potential ice fallout.

- The Probability of a Seismic Disturbance Coincident With or Subsequently Followed by a LOCA or HELB is Low

  The proposed amendment revises the WBN FSAR by requiring an inspection of the ice condenser within 24 hours of experiencing a seismic event greater than or equal to an Operating Basis Earthquake (OBE) within the five (5) week period after the completion of ice basket replenishment to confirm that adverse ice fallout has not occurred which could impede the ability of the ice condenser lower inlet doors to open. This action would be taken, in lieu of requiring a five week waiting period following ice loading, prior to ascension to power operations.

  Although this License Amendment Request is not presented as a risk-informed change under the guidance of Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," consideration of the probability of occurrence provides an insight into the very small risk involved in the proposed change.

  The annual probability of exceedance for the OBE level earthquake at Watts Bar was derived from EPRI RP 101-53. The ice condenser was conservatively assumed to be required by the applicable operating mode for the entire 5 week fusion period. The probability that the ice condensers doors could become impeded during the 5 week period was assumed to be one. The likelihood of a LOCA or HELB, which would require the ice condenser, following the impediment was then estimated with time constraints as noted below. The ice condenser inspection is required within 24 hours. If the ice condenser lower inlet doors are determined to be impeded and can not be restored, the unit must be in Mode 5 within the next 37 hours. Therefore, the total exposure time for consideration of a subsequent event is 61 hours. The frequency of LOCAs and HELBs were derived from NUREG/CR-6928 and NUREG/CR-5750 and the WBN availability factor.

  As a result, the probability of ice condenser impairment and subsequent challenge is estimated to be less than 3.7E-09 for Watts Bar Nuclear Plant during the "period of potential exposure." This is a very low probability as would be expected by the nature of the events.

  Approval of the proposed amendment is justifiable based upon the low probability that a LOCA or HELB would occur coincident with or subsequent to an OBE during the "period of potential exposure." After the five-week fusion time has

been reached, the Westinghouse Topical Report WCAP-8110, Supplement 9-A test report concludes that acceptable levels of ice fallout occur for all expected seismic events, up to and including the Safe Shutdown Earthquake.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The proposed inspection of the ice condenser within 24 hours of experiencing a seismic event equal to or greater than an OBE within the five (5) week period after ice basket replenishment provides an alternate method of confirming that the lower inlet doors would open subsequent to a seismic event. Justification for the use of the proposed methodology is based upon reasonable assurance that the ice condenser doors would function following a seismic event, and the low probability of a seismic event coincident with, or immediately followed by a Design Basis Accident.

This LAR does not alter or revise the current bounding safety analyses of record. With NRC's approval of this LAR, WBN will maintain its compliance with the applicable regulations and requirements. These are:

- 10 CFR 50, Appendix A, General Design Criterion (GDC) 2, "Design Basis For Protection Against Natural Phenomena," which requires that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes;

- GDC 16, "Containment Design," which requires that the reactor Containment and associated systems provide an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment;

- GDC 38, "Containment Heat Removal," which requires that a system be provided to remove heat from the reactor Containment; and

- GDC 50, "Containment Design Basis," which requires that the reactor Containment structure be designed with conservatism to accommodate applicable design parameters (pressure, temperature, leakage rate).

This LAR is being submitted in accordance with 10 CFR 50.90.

4.2 Precedent

The NRC approved a similar license amendment request from Indiana Michigan Power, the licensee for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2, on April 16, 2008. The NRC approved a similar license amendment request from Duke Power Company for McGuire Nuclear Station on April 2, 2008. The WBN proposed change is comparable to these amendments.

4.3 Significant Hazards Consideration

TVA has concluded that operation of WBN Nuclear Plant, Unit 1 in accordance with the proposed change to the UFSAR 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).

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

The analyzed accidents of consideration in regard to changes potentially affecting the ice condenser are a loss of coolant accident and a steam or feedwater line break inside Containment. The ice condenser is an accident mitigator and is not postulated as being the initiator of a LOCA or HELB. The ice condenser is structurally designed to withstand a Safe Shutdown Earthquake plus a Design Basis Accident and does not interconnect or interact with any systems that interconnect or interact with the Reactor Coolant, Main Steam, or Feedwater systems. Because the proposed changes do not result in, or require any physical change to the ice condenser that could introduce an interaction with the Reactor Coolant, Main Steam, or Feedwater systems, there can be no change in the probability of an accident previously evaluated.

Under the proposed change, there is some finite probability that, within 24 hours following a seismic disturbance, a LOCA or HELB in Containment could occur within five weeks of the completion of ice basket replenishment. However, several factors provide defense-in-depth and tend to mitigate the potential consequences of the proposed change.

Design basis accidents are not assumed to occur simultaneously with a seismic event. Therefore, the coincident occurrence of a LOCA or HELB with a seismic event is strictly a function of the combined probability of the occurrence of independent events, which in this case is very low. Based on the Probabilistic Risk Assessment model and seismic hazard analysis, the combined probability of occurrence of a seismic disturbance greater than or equal to an OBE during the 5 week period following ice replenishment coincident with or subsequently followed by a LOCA or HELB during the time required to perform the proposed inspection (24 hours) and if required by Technical Specifications, complete Unit shutdown (37 hours), is less than 3.7E-09 for WBN. This probability is well below the threshold that is typically considered credible.

Even if ice were to fall from ice baskets during a seismic event occurring coincident with or subsequently followed by an accident, the ice condenser would be expected to perform its intended safety function. Due to the ice servicing methodology utilized by WBN, the relatively small amount of ice that may potentially fallout from the ice baskets to the floor behind the lower inlet doors during the seismic event is such that complete blockage of flow into the ice condenser is not credible during a LOCA or HELB.

Based on the above, the proposed changes do not involve a significant increase in the probability or consequences. The ice condenser is expected to perform its intended safety function under all circumstances following a LOCA or HELB in Containment.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

The proposed change provides an alternate methodology to confirm the ice condenser lower inlet doors are capable of opening if a seismic event occurs within five weeks of ice basket replenishment. As previously discussed, the ice condenser is not postulated as an initiator of any design basis accident. The proposed change does not impact any plant system, structure, or component that is an accident initiator. The proposed change does not involve any hardware changes to the ice condenser or other changes that could create new accident mechanisms. Therefore, there can be no new or different accidents created from those previously identified and evaluated.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

   Response: No.

Margin of safety is related to the confidence in the ability of the fission product barriers to perform their design functions during and following an accident situation. These barriers include the fuel cladding, the Reactor Coolant system, and the Containment system. The performance of the fuel cladding and the Reactor Coolant system will not be impacted by the proposed change.

The requirement to inspect the ice condensers within 24 hours of experiencing seismic activity greater than or equal to an OBE during the five (5) week period following the completion of ice basket replenishment will confirm whether the ice condenser lower inlet doors are capable of opening. This inspection will either confirm that the ice condenser doors remain fully capable of performing their intended safety function under credible circumstances or that a Unit shutdown is required.

The ice condenser has reasonable assurance of performing its intended function during the highly unlikely scenario in which a postulated accident (LOCA or HELB) occurs coincident with or subsequently following a seismic event.

The proposed change affects the assumed timing of a postulated seismic and design basis accident applied to the ice condenser and provides an alternate methodology in confirming the ice condenser lower inlet doors are capable of

opening. As previously discussed, the combined probability of occurrence of a LOCA or HELB and a seismic disturbance greater than or equal to an OBE during the "period of potential exposure" is less than 3.7E-09 for WBN. This probability is well below the threshold that is considered credible.

Therefore, the proposed change does not involve a significant reduction in the margin of safety. The WBN ice condenser will perform its intended safety function under credible circumstances.

The changes proposed in this LAR do not make any physical alteration to the ice condensers, nor does it affect the required functional capability of the ice condenser in any way. The intent of the proposed change to the FSAR is to eliminate an overly restrictive waiting period prior to Unit ascent to power operations following the completion of ice basket replenishment. The required inspection of the ice condenser following a seismic event greater than or equal to an OBE will confirm whether the ice condenser lower inlet doors will continue to fully perform their safety function as assumed in the WBN safety analyses.

Thus, it can be concluded that the proposed change does not involve a significant reduction in the margin of safety.

Based on the above, TVA concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

The following documents were consulted:

a. WCAP-8110, Supplement 9, dated May 13, 1974

b. AEC Evaluation of WCAP-8110, Supplement 9-A, dated Nov 21, 1974

c. Memorandum from P. S. Tam, NRC, "Summary of December 12, 2007, Meeting with I&M on the Issue of Ice Condenser Ice Fusion (TAC No. MD6756)," dated December 20, 2007 (ADAMS Accession Number ML073470330)

ATTACHMENTS

1. List of Regulatory Commitments
2. FSAR Page Markups

ATTACHMENT 1

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

LIST OF REGULATORY COMMITMENTS

The list below identifies those actions committed to by TVA in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments. Please direct questions regarding these commitments to Michael K. Brandon, Site Licensing and Industry Affairs Manager, (423) 365-1824.

1. Implement WBN station procedures requiring the inspection of the ice condenser within 24 hours of experiencing a seismic event greater than or equal to an Operating Basis Earthquake (OBE) within the five (5) week period after the completion of ice basket replenishment.

ATTACHMENT 2

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

PROPOSED FSAR CHANGES (MARK-UP)

I. AFFECTED PAGE LIST

6.7-37

II. MARKED PAGES

See attached.

B. Sufficient clearance is required for doors to open into the ice condenser. Items to be considered in this interface are floor clearance, lower support, structure clearance and floor drain operation and sufficient clearance (approximately six inches) to accommodate ice fallout in the event of a seismic disturbance occurring coincident with a loss-of-coolant accident.

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C. Door opening and stopping forces are transmitted to the crane wall and lower support structure, respectively.

Design Loads

Pressure loading during LOCA is provided by the Transient Mass Distribution (TMD) code from an analysis of a double-ended hot leg break in the corner formed by the refueling canal, with 100% entrainment of water in the flow. For conservatism, TMD results were increased by 40% in performing the design analysis for the lower inlet doors.

The lower inlet door design parameters and loads are presented in Table 6.7-19.

6.7.8.2 System Design

Twenty-four pairs of inlet doors are located on the ice condenser side of ports in the crane wall at an elevation immediately above the ice condenser floor. General location and details of these doors are shown in Figures 6.7-17 through 6.7-21. Each door panel is 92.5 in. high, 42 in. wide and 7.5 in. thick. Each pair is hinged vertically on a common frame.

Each door consists of a 0.5 in. thick fiber reinforced polyester (FRP) plate stiffened by six steel ribs, bolted to the plate. The FRP plate is designed to take vertical bending moments resulting from pressures generated from a LOCA and from subsequent stopping forces on the door. The ribs are designed to take horizontal bending moments and reactions, as well as tensile loads resulting from the door angular velocity, and transmit them to the crane wall via the hinges and door frame.

Seven inches of urethane foam are bonded to the back of the FRP plate to provide thermal insulation. The front and back surfaces of the door are protected with 26 gauge stainless steel covers which provide a complete vapor barrier around the insulation. The urethane foam and stainless steel covers do not carry overall door moments and shearing forces.

Three hinge assemblies are provided for each door panel; each assembly is connected to two of the door ribs. Loads from each of the two ribs are transmitted to a single 1.572-inch diameter hinge shaft through brass bushings. These bushings have a spherical outer surface which prevents binding which might otherwise be caused by door rib and hinge bar flexure during accident loading conditions.

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Original ice basket qualification testing (Topical Report WCAP-8110, Supplement 9-A), has shown freshly loaded ice is considered fused after five weeks. In the event of an earthquake (OBE or greater) which occurs within five weeks following the completion of ice basket replenishment, plant procedures require a visual inspection of applicable areas of the ice condenser within 24 hours to confirm that opening of the ice condenser lower inlet doors is not impeded by any ice fallout resulting from the seismic disturbance. The 24 hour time frame for inspection is applicable during modes where the lower inlet doors are required to be operable; otherwise perform this inspection prior to startup. This alternative method of compliance with the requirements of GDC 2 is credible based upon the reasonable assurance that the ice condenser doors will open following a seismic event during the 5 week period and the low probability of a seismic event occurring coincident with or subsequently followed by a Design Basis Accident.