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

Richard T. Purcell
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TVA-WBN-TS-98-014 10 CFR 50.90

NOV 2 0 1998

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. 98-014 - ICE BED FLOW BLOCKAGE - SURVEILLANCE REQUIREMENT 3.6.11.4

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 revise (1) the WBN TS and associated TS Bases for Surveillance Requirement (SR) 3.6.11.4 to change the methodology for determining ice condenser ice bed flow blockage, and (2) the TS Bases for TS 3.6.12 Condition B to add a clarifying note regarding Condition entry when performing required ice condenser surveillances, minor maintenance, or a routine task such as a system walkdown.

For SR 3.6.11.4, the 0.38 inch frost/ice buildup criteria will be replaced with a more conservative program based on percent flow blockage. This change will provide results that are directly related to design basis and accident analysis limitations. Currently, the flow blockage condition of the WBN Unit 1 ice condenser meets existing TS and safety analysis requirements. That is, SR 3.6.11.4 is within its frequency of once per 18 months, as it was last performed during WBN's first refueling outage of October/November 1997, and the actual percent flow blockage has been determined to be well within safety limits. This conclusion is based on engineering evaluations (similar to the proposed amendment) performed in June and August of 1998. These evaluations showed the percentage of flow blockage to be sufficiently within design/accident limitations.

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

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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 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 the commitment made in this application.

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

Sincerely,

R. T. Purcell

Enclosures
cc: See page 3

Subscribed and sworn to before me
on this 20th day of November, 1998.

E. Jeannette Long
Notary Public

My Commission Expires June 27, 2001

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ENCLOSURE 1

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

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-98-014
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 to alter the acceptance criteria in surveillance requirement (SR) 3.6.11.4, and to revise the Bases for TS 3.6.12 Action Condition B to add a note that clarifies entry into ACTION Condition B is not specifically required for the performance of ice condenser surveillances, maintenance, or a routine task such as a system walkdown.

Specifically, SR 3.6.11.4 requires a visual inspection of the air/steam flow passages within the ice condenser. The proposed amendment replaces the current visual inspection requirement that uses a 0.38 inch ice/frost buildup criteria with a visual surveillance program that provides an increased confidence level that flow blockage does not exceed the 15 percent assumed in the accident analyses. Whereas, the 0.38 inch program required inspection of as few as two flow passages per ice condenser bay, the new program will require at least 54 passages (33 percent) per bay to be inspected. This change also deletes "frost" from the SR. The Westinghouse definition for frost has been added to the TS Bases to explain why frost is not an impediment to air/steam flow through the ice condenser.

Additionally, a note is added to the Bases of TS 3.6.12 to clarify that entry into ACTION Condition B is not required for personnel standing on or opening intermediate deck or upper deck doors for short durations for the performance of ice condenser related surveillances, minor maintenance, or a routine task such as a system walkdown.

II. REASON FOR THE PROPOSED CHANGE

Recent industry events related to the ice condenser prompted WBN's review of related technical specifications. Related accident analyses show that over pressurization of lower containment subcompartments and the steel vessel will not occur with up to 15 percent blockage of the design ice condenser flow paths. Review of SR 3.6.11.4 determined that it does not adequately provide for the full intent of the surveillance. Through discussions with Westinghouse, TVA has determined that there is no direct correlation between the existing standard TS 0.38 inch criteria for ice/frost

accumulation on flow passage structural members and the percentage of overall flow blockage assumed in the plant analyses for WBN. However, the proposed amendment provides an acceptance criteria of ≤ 15 percent blockage, which is directly related to this functional requirement.

Because frost, as recognized by Westinghouse, is not an impediment to steam and air flow, and to preclude potential declarations of inoperability due to frost rather than ice, the Westinghouse definition for frost has been added to the Bases of SR 3.6.11.4, and frost specifically excluded as flow path blockage.

The revision to the Bases of TS 3.6.12 adds a clarifying note that entry into Condition B is not required solely because personnel are standing on or opening intermediate deck or upper deck doors for short durations for the performance of required ice condenser surveillances, minor maintenance, or routine tasks. This eliminates unnecessary declaration of entry into Condition B when these activities are performed, but does not preclude its entry if during these activities doors are found to be open, or otherwise physically restrained or inoperable.

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).

The ice condenser is an annular compartment enclosing about 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 (lower inlet 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 (upper deck doors) that are exposed to the upper containment atmosphere, and also remain closed during normal plant operation. A third set of doors (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 that comprise the ice bed within the ice condenser are arranged to promote

heat transfer from steam to the ice. This arrangement enhances the ice condenser's primary function of condensing steam and absorbing the heat energy released to the containment during a LOCA or HELB.

Should a LOCA or HELB occur, the ice condenser inlet doors (lower containment area) open due to the pressure rise in the lower compartment. This allows air and steam to flow from the lower compartment into the ice condenser. The resulting pressure increase within the ice condenser then causes the intermediate and top deck doors to open (or for a small pressure increase associated with certain small break LOCAs, to bypass through curtains), which allows the air/steam to flow out of the ice condenser into the upper compartment. Steam condensation within the ice condenser limits the pressure and temperature buildup within containment. A divider barrier separates the upper and lower compartments and ensures steam is directed into the ice condenser. The ice, together with the containment spray, is adequate to absorb the initial blowdown of steam and water from a LOCA or HELB and the additional heat loads that would enter containment during several hours following initial blowdown.

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

Proper operation of the ice condenser requires the ice to be distributed uniformly throughout the ice condenser and for open flow paths to exist around the ice baskets. This is especially important during the initial blowdown so that (1) the steam and water mixture entering the lower compartment do not pass through only part of the ice condenser depleting the ice there while bypassing the ice in other portions of the ice condenser, and (2) to ensure there is sufficient air and steam flow (i.e., no choke flow) through the ice condenser to prevent lower compartment overpressurization, as this could result in structural failure of the subcompartment walls or containment vessel. Westinghouse analysis has shown that overpressurization of the lower compartment will not occur provided the overall blockage is less than the 15 percent section blockage assumed in the transient mass distribution (TMD) analysis. This analysis is not a detailed flow channel analysis. Instead, it lumps the ice condenser bays into six sections of 2.75, 3.25, 6.50, 4.50, 3.50, and 3.50 bays. Sensitivity analyses performed in the 1970's showed that up to 15 percent of the channel flow area can be blocked. According to Westinghouse, an acceptable level of blockage is one that

meets the 15 percent criterion based upon the TMD lumping method. That is, there can be individual bays with blockage of greater than 15 percent, or even individual channels blocked, provided the highest calculated percent blockage in any of the TMD lumped sections is $\leq$ 15 percent.

The current SR 3.6.11.4 inspection criteria of 0.38 inch ice buildup implies that it is acceptable to have this much accumulation over the entire ice condenser. However, a uniform 0.38 inch ice buildup on all the ice baskets and lattice frame surfaces is equivalent to approximately 50 percent flow blockage. According to Westinghouse, selection of the 0.38 inch ice buildup limit was not based on a quantitative reason associated with the accident analyses or any specific analysis. Rather, the intent of the 0.38 inch value was to ensure that ice condenser flow paths were maintained, and that there was no occurrence of gross ice buildup, significant flow blockage between ice baskets, or gross degradation of refrigeration and/or air circulation equipment and systems. The 0.38 inch value was selected as being equivalent to the thickness of the structural cross members in the lattice frame support. This provided the inspector or personnel performing the surveillance with a convenient "in-place" gauge to assess whether surveillance requirements were or were not being met. The 0.38 inch criterion was to be used for the purpose of initiating a more detailed inspection, and not necessarily to verify adequacy of the 15 percent ice condenser flow blockage limits imposed by the accident analyses. The detailed inspection would confirm that the accident ice buildup limit had not been exceeded.

The proposed amendment provides a methodology for evaluating ice condenser flow blockage that is more conservative than the 0.38 inch criteria. First, it provides results in terms of percent flow blockage, which is directly related to the accident analysis limitations. Secondly, it requires a minimum of 54 (33 percent) of the flow passages per bay be inspected, as compared to a minimum of 2 passages per bay under the 0.38 inch criteria. The increased sampling would provide an increased confidence level in the results of the inspection. Thus, the proposed amendment improves assurance that actual ice condenser flow blockage is known and being maintained within accident analysis assumptions.

Currently, the Bases for SR 3.6.11.4 identifies the area of a flow channel to include the lower inlet plenum support structures, turning vanes, ice baskets, lattice frames, and intermediate and top deck floor gratings. As identified by Westinghouse, the most restrictive flow passage location is at a lattice frame elevation. For this reason the proposed change now defines flow channels, as it applies to the 15 percent flow blockage criteria, to be that area between ice baskets and past lattice frames and wall panels. As WBN

does not have an intermediate floor grating, it has been deleted from the definition. Because it would require a gross buildup of ice on the lower inlet plenum support structures, turning vanes, and upper deck floor grating before degradation in air and steam flow occurred, these structures have been excluded as part of a flow channel for application of the 15 percent blockage criteria. Plant and industry experience have shown that removal of ice from the exempt structures during the refueling outage is sufficient to ensure their operability throughout the operating cycle. Therefore, plant procedures will require a 100 percent inspection and evaluation for any gross ice buildup on the excluded structures, and the removal of identified ice.

Also included in the change to the TS Bases for SR 3.6.11.4 is the exclusion of frost from flow blockage determinations. The Bases change defines frost as ice which is loosely adherent and can be easily brushed or knocked off by the hand. Westinghouse concurs that loose ice is judged to either melt or be blown out very quickly during a DBA. Thus, excluding frost from the flow blockage determination does not impact the safety analyses.

The note added to clarify that entry into TS 3.6.12 Condition B is not required when performing surveillances, minor maintenance, and routine tasks (e.g., system engineer walk downs and special inspections) does not affect the safety analyses. This note only applies to tasks necessary to ensure ice condenser operability, require only a minimal time to perform, and involve a small number of personnel. Condition B was provided for intermediate and upper deck doors found to be physically restrained from opening, and for any door conditions that threaten ice melt or sublimation, such as a door being found open or incapable of full closure. Performance of required Actions B.1 and B.2 are not necessary when momentarily opening a door (1) to determine if it is physically restrained, (2) to conduct minor maintenance activities such as ice removal, or (3) to perform routine tasks such as system walkdowns.

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 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 TS amendment and TS Bases changes will not increase the probability of occurrence or consequences of any previously analyzed accident. Neither the TS amendment nor the TS Bases changes can increase the probability of occurrence of any analyzed accident

because they are not the result or cause of any physical modification to ice condenser structures, and for the current design of the ice condenser, there is no correlation between any credible failure of it and the initiation of any previously analyzed event.

Regarding the consequences of analyzed accidents, the ice condenser is an engineered safety feature designed, in part, to limit the containment subcompartment and steel vessel pressures immediately following the initiation of a LOCA or HELB. Conservative Westinghouse analysis shows this criteria will be met if the reduction in the integrated area per bay provided for ice condenser air/steam flow paths is $\leq$ 15 percent, or if the total flow area blocked within each lumped analysis section is less than the 15 percent assumed in the safety analysis. The present 0.38 inch frost/ice buildup surveillance criteria only addresses the acceptability of any given flow path, and has no existing correlation between flow paths exceeding this criteria and percent of total flow path blockage. In fact, it was never the intent of the current SR to make such a correlation. If problems were encountered in meeting the 0.38 inch criteria, it was expected that additional inspection and analysis, such as provided in the proposed amendment, would be performed to make such a determination. Thus, the proposed amendment for flow blockage determination provides the necessary assurance flow path requirements are met without additional evaluations, and thus will not increase the consequences of a LOCA or HELB.

In regard to the TS 3.6.12 Bases change, clarifying that Condition B does not apply when personnel are standing on or opening doors for short durations to perform surveillances or minor maintenance activities such as ice removal, does not increase analyzed accident consequences. These are not new or additional actions to those performed previously, the probability of an accident versus the time to perform these actions is small, the number of personnel involved is small, and their duration is generally much less than the four hour frequency of Required Action B.1 (monitor maximum ice condenser temperature). Therefore, these activities do not adversely affect ice bed sublimation, melting, or ice condenser flow paths. However, if during these activities any door is determined to be restrained, not fully closed from a previous activity, or otherwise not operable, then separate entry into Condition B is required for each door so identified.

B. The proposed TS amendment and TS Bases change do not create the possibility of a new or different kind of accident from any previously analyzed accident. For

such a possibility to exist, there would have to be either a physical change to the ice condenser, or some change in how it is operated or physically maintained. None of the above is true for the proposed TS amendment and TS Bases change. There is no change to the existing design requirements or inputs/results of any accident analysis calculations.

C. The proposed amendment does not involve a significant reduction in a margin of safety. Westinghouse has shown that with 85 percent of the total flow area available, the ice condenser will perform its intended function. Thus, the safety limit for ice condenser operability is less than or equal to 15 percent blockage of flow paths. SR 3.6.11.4 currently uses a specific value of 0.38 inch buildup to determine if unacceptable frost/ice blockage exists in the ice condenser. However, this specific value does not have a direct correlation to the safety limit for blockage of ice condenser flow area. The proposed TS amendment requires more extensive visual inspection (54 flow channels/bay) than is currently described (2 flow channels/bay) in the TS Bases for SR 3.6.11.4, thus providing greater reliability and a direct relationship to the analytical safety limits. Because the safety limit for ice condenser flow is $\leq$ 15 percent blockage of total flow area, changing the TSs to implement a surveillance program that is more reliable and uses acceptance criteria of $\leq$ 15 percent flow blockage, as allowed by the TMD analysis, will not reduce the margin of safety of any TS. Thus, design limits for the continued safe function of containment subcompartment walls and the steel vessel are not exceeded due to this change.

The change made to TS 3.6.12 Bases does not affect the margin of safety as defined in any TS as it does not involve design specifications or acceptance criteria. This change only adds a clarifying note that entry into Condition B is not required solely because of actions (standing on and opening intermediate/upper deck doors) necessary for the performance of required ice condenser surveillances, maintenance, or routine activities. This does not preclude entry into Condition B during performance of these activities should an intermediate deck door or upper deck door otherwise be determined inoperable.

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.