UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 17, 2000

Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 - ISSUANCE OF AMENDMENT REGARDING ICE CONDENSER FLOW CHANNEL INSPECTION REQUIREMENTS (TAC NO. MA4295)

Dear Mr. Scalice:

The Commission has issued the enclosed Amendment No. 25 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1. This amendment is in response to your application (TS-98-014) dated November 20, 1998, as supplemented July 19, 1999 and January 31, 2000. The amendment revises the Technical Specifications (TS) to change the surveillance requirements for an inspection of the ice condenser flow channels that previously used a 0.38 inch ice/frost buildup criterion to a criterion that limits flow blockage to the 15 percent value that was used in the accident analysis. Changes to the Bases were also made. Tennessee Valley Authority also indicated that its proposal is consistent with TS Traveler Form No. 336.

A copy of the safety evaluation is also enclosed. Notice of issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Robert E. Martin, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosures: 1. Amendment No. 25 to NPF-90
2. Safety Evaluation

cc w/enclosures: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

WATTS BAR NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 25
License No. NPF-90

1. The Nuclear Regulator Commission (the Commission) has found that:

   A. The application for amendment by Tennessee Valley Authority (the licensee) dated November 20, 1998, as supplemented July 19, 1999 and January 31, 2000. complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-90 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 25 , and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. TVA shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance, to be implemented no later than prior to startup following the Unit 1, Cycle 3 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Project Licensing Management
Office of Nuclear Reactor Regulation

Attachment: 25
Changes to the Technical
Specifications

Date of Issuance: July 17, 2000

ATTACHMENT TO AMENDMENT NO. 25

FACILITY OPERATING LICENSE NO. NPF-90

DOCKET NO. 50-390

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change.

Remove Pages	Insert Pages
3.6 - 29	3.6 - 29
B 3.6 - 65	B 3.6 - 65
B 3.6 - 66	B 3.6 - 66
B 3.6 - 71	B 3.6 - 71
B 3.6 - 72	B 3.6 - 72
----	B 3.6 - 72a
B 3.6 - 78	B 3.6 - 78

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.11.2	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
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 ≥ 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 3.6.11 Ice Bed

BASES

BACKGROUND

The ice bed consists of over 2,403,800 lb 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 air and steam 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 doors to open, which allows the air to flow out of the ice condenser into

(continued)

BACKGROUND (continued)

the upper compartment. Steam condensation within the ice condenser limits the pressure and temperature buildup in containment. A divider barrier separates the upper and lower compartments and ensures that the 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 DBA and the additional heat loads that would enter containment during several hours following the initial blowdown. The additional heat loads would come from the residual heat in the reactor core, the hot piping and components, and the secondary system, including the steam generators. During the post blowdown period, the Air Return System (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 from the lower compartment through the ice condenser where the heat is removed by the remaining ice.

As ice melts, the water passes through the ice condenser floor drains into the lower compartment. Thus, a second function of the ice bed is to be a large source of borated water (via the containment sump) for long term Emergency Core Cooling System (ECCS) and Containment Spray System heat removal functions in the recirculation mode.

A third function of the ice bed and melted ice is to remove fission product iodine that may be released from the core during a DBA. Iodine removal occurs during the ice melt phase of the accident and continues as the melted ice is sprayed into the containment atmosphere by the Containment Spray System. The ice is adjusted to an alkaline pH that facilitates removal of radioactive iodine from the containment atmosphere. The alkaline pH also minimizes the occurrence of the chloride and caustic stress corrosion on mechanical systems and components exposed to ECCS and Containment Spray System fluids in the recirculation mode of operation.

It is important for the ice to be uniformly distributed around the 24 ice condenser bays and for open flow paths to exist around ice baskets. This is especially important during the initial blowdown so that 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 bays.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.11.3

This SR ensures that the azimuthal distribution of ice is reasonably uniform, by verifying that the average ice weight in each of three azimuthal groups of ice condenser bays is within the limit. 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.

SR 3.6.11.4

This SR ensures that the air/steam flow channels through the ice bed have not accumulated ice blockage that exceeds 15 percent of the total flow area through the ice bed region. The allowable 15 percent buildup of ice is based on the analysis of the subcompartment response to a design basis LOCA with partial blockage of the ice bed flow channels. The analysis did not perform detailed flow area modeling, but rather lumped the ice condenser bays into six sections ranging from 2.75 bays to 6.5 bays. Individual bays are acceptable with greater than 15 percent blockage, as long as 15 percent blockage is not exceeded for any analysis section.

To provide a 95 percent confidence that flow blockage does not exceed the allowed 15 percent, the visual inspection must be made for at least 54 (33 percent) of the 162 flow channels per ice condenser bay. The visual inspection of the ice bed flow channels is to inspect the flow area, by looking down from the top of the ice bed, and where view is achievable up from the bottom of the ice bed. Flow channels to be inspected are determined by random sample. As the most restrictive flow passage location is found at a lattice frame elevation, the 15 percent blockage criteria only applies to "flow channels" that comprise the area:

a. between ice baskets, and

b. past lattice frames and wall panels.

Due to a significantly larger flow area in the regions of the upper deck grating and the lower inlet plenum and turning vanes, it would require a gross buildup of ice on these structures to obtain a degradation in air/steam flow. Therefore, these structures are 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 excluded structures during the refueling outage is sufficient to ensure they remain operable throughout the

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.6.11.4 (continued)

operating cycle. Thus, removal of any gross ice buildup on the excluded structures is performed following outage maintenance activities.

Operating experience has demonstrated that the ice bed is the region that is the most flow restrictive, due to the normal presence of ice accumulation on lattice frames and wall panels. The flow area through the ice basket support platform is not a more restrictive flow area because it is easily accessible from the lower plenum and is maintained clear of ice accumulation. There is not a mechanistically credible method for ice to accumulate on the ice basket support platform during plant operation. Plant and industry experience has shown that the vertical flow area through the ice basket support platform remains clear of ice accumulation that could produce blockage. Normally only a glaze may develop or exist on the ice basket support platform which is not significant to blockage of flow area. Additionally, outage maintenance practices provide measures to clear the ice basket support platform following maintenance activities of any accumulation of ice that could block flow areas.

Frost buildup or loose ice is not to be considered as flow channel blockage, whereas attached ice is considered blockage of a flow channel. Frost is the solid form of water that is loosely adherent, and can be brushed off with the open hand.

The Frequency of 18 months was based on ice storage tests and the allowance built into the required ice mass over and above the mass assumed in the safety analyses.

SR 3.6.11.5

Verifying the chemical composition of the stored ice ensures that the stored ice has a boron concentration of ≥ 1800 ppm and

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.11.5 (continued)

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

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

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

(continued)

ACTIONS (continued)

A.1

If one or more ice condenser inlet doors are inoperable due to being physically restrained from opening, the door(s) must be restored to OPERABLE status within 1 hour. The Required Action is necessary to return operation to within the bounds of the containment analysis. The 1 hour Completion Time is consistent with the ACTIONS of LCO 3.6.1, "Containment," which requires containment to be restored to OPERABLE status within 1 hour.

B.1 and B.2

If one or more ice condenser doors are determined to be partially open or otherwise inoperable for reasons other than Condition A or if a door is found that is not closed, it is acceptable to continue plant operation for up to 14 days, provided the ice bed temperature instrumentation is monitored once per 4 hours to ensure that the open or inoperable door is not allowing enough air leakage to cause the maximum ice bed temperature to approach the melting point. The Frequency of 4 hours is based on the fact that temperature changes cannot occur rapidly in the ice bed because of the large mass of ice involved. The 14 day Completion Time is based on long term ice storage tests that indicate that if the temperature is maintained below 27°F, there would not be a significant loss of ice from sublimation. If the maximum ice bed temperature is > 27°F at any time, or ice bed temperature is not verified to be within the specified Frequency as augmented by the provisions of SR 3.0.2, the situation reverts to Condition C and a Completion Time of 48 hours is allowed to restore the inoperable door to OPERABLE status or enter into Required Actions D.1 and D.2. [Note: entry into Condition B is not required due to personnel standing on or opening an intermediate deck or upper deck door for short durations to perform required surveillances, minor maintenance such as ice removal, or routine tasks such as system walkdowns.]

C.1

If Required Actions or Completion Times of B.1 or B.2 are not met, the doors must be restored to OPERABLE status and closed positions within 48 hours. The 48 hour Completion Time is based on the fact that, with the very large mass of ice involved, it would not be possible for the temperature to decrease to the melting point and a significant amount of ice to melt in a 48 hour period.

(continued)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 25 TO FACILITY OPERATING LICENSE NO. NPF-90

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-390

1.0 INTRODUCTION

By letter dated November 20, 1998, as supplemented July 19, 1999 and January 31, 2000, the Tennessee Valley Authority (TVA, the licensee) submitted a request for changes to the Watts Bar Nuclear Plant, Unit 1 (WBN) Technical Specifications (TS). The requested changes revise the TS Surveillance Requirement (SR) 3.6.11.4 to change the SRs for an inspection of the ice condenser flow channels that previously used a 0.38 inch ice/frost buildup criterion to a criterion that limits flow blockage to the 15 percent value that was used in the accident analysis. Changes to Bases were also made. The January 31, 2000, letter provided clarifying information that did not change the initial proposed no significant hazards consideration determination or expand the application beyond the scope of the original notice.

2.0 BACKGROUND

TVA's application is one of the products of an initiative between the U.S. Nuclear Regulatory Commission (NRC) staff and the Ice Condenser Mini Group (ICMG). The ICMG also interfaces in a parallel manner with the NRC staff through the Nuclear Energy Institute's (NEI's) program for addressing proposed changes to the Standard Technical Specifications (STS). With respect to the subject of this safety evaluation, the need for consideration of changes to the TS for ice condenser containment plants was addressed in the letter from William Beckner, NRC, to James Davis, NEI, dated October 2, 1998, as follows:

> Over the past several weeks, a number of issues have been raised relative to licensee compliance with the technical specifications (TS). These TS involve ice condenser plants with TS similar to the Westinghouse Improved Standard Technical Specifications (iSTS) 3.6.15 "Ice Bed". These issues involved several different surveillances in this section and have highlighted problems literally complying with the TS, ambiguities in the requirements, and in at least one case a TS with no apparent relationship to the design basis.
>
> SR 3.6.15.4 requires inspection of the flow channels to ensure that ice buildup is not restricting the channels. Either the TS or, in the case of the iSTS, the

ENCLOSURE

Bases, further define specific locations to be inspected which include the lower inlet plenum and turning vanes. Inspection of the lower plenum and turning vanes is not possible during power operation and thus presents a problem since the frequency is 9 months in the iSTS. Inspection of these same locations is also probably not necessary since these areas do not represent the minimum flow areas which would be most susceptible to blockage by ice buildup. Licensees have avoided problems in the past by either modifying the frequency from the iSTS value to every 18 months or simply (incorrectly?) interpreting the TS to not require inspection of these inaccessible areas.

SR 3.6.15.4 requires verification of ice on structural members of < [0.38] inch. This value has nothing to do with the design basis of the plant. A uniform coating of this thickness would provide significantly more flow blockage than assumed in design basis calculations while at the same time, isolated areas with greater than this thickness of ice may not provide excess flow blockage.

TVA responded to this issue for the Watts Bar plant in its submittal dated July 19, 1999, as follows:

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 routing 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.

3.0 EVALUATION

3.1 TS on 0.38 Ice Thickness vs 15 % Flow Area Blockage

SR 3.6.11.4 is changed from its previous form to the updated form, as shown below:

Previous form: Verify, by visual inspection, accumulation of ice or frost on structural members comprising flow channels through the ice condenser is ≤ 0.38 inch thick.

Updated form: 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.

As noted above, the purpose of the change is to revise the TS such that it is based on the design basis analysis for the plant. TVA indicates that Westinghouse analysis has shown that over-pressurization 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. As described in TVA's response to NRC's request for additional information (RAI) of January 31, 2000, RAI 2, parts a and b, the TMD analysis lumps the ice condenser bays into six sections of 2.75, 3.25, 6.50, 4.50, 3.50 and 3.50 bays. A TMD analysis was performed specifically for WBN, demonstrating that 15 percent effective flow blockage was acceptable. The analysis methodology supports that there can be individual bays with blockage of greater than 15 percent, or even individual channels blocked, provided the highest calculated percent blockage in each of the TMD lumped sections is ≤ 15 percent. TVA also provided a revision to SR 3.6.11.4 in its January 31, 2000, letter that clarifies that the 15% blockage inspection criterion applies to each of the six analysis sections. These responses resolve the staff's concerns on this matter and are acceptable.

The Bases for SR 3.6.11.4 have been changed from requiring inspection of as few as two flow passages per each of the 24 ice condenser bays, to now require at least 54 passages (33 percent) per bay to be inspected. The staff agrees with the licensee's conclusion that this increased sampling would provide an increased confidence level in the results of the inspection.

The Bases for WBN's SR 3.6.11.4 has been changed to state that a 95 percent confidence will be provided that flow blockage calculated from the inspection sample size of at least 33 percent of the 162 flow channels per bay does not exceed the allowed 15 percent limit. The staff requested additional information in a letter dated November 18, 1999, on this and other issues. TVA responded in its letter of January 31, 2000, with a discussion of the basis for the provision of a 95 percent confidence level. TVA indicated that the statistical methodology is the same as that previously referenced to support an application for an amendment to the Sequoyah Nuclear Plant (SQN) TS (References 3 and 4). The statistical methodology is not included in the SQN letters but is included in a Westinghouse letter to SQN (reference 5). The Westinghouse letter provides details on the statistical calculational methodology including a discussion of how the statistical equations have been converted to a set of tables. Flow channel inspection results for each bay may be compared to the tables to determine whether the 15 percent limit is met. The

staff has reviewed TVA's response, utilizing the guidance in references 6 and 7, and agrees that the described methodology is acceptable for the stated purpose.[1]

RAI 2, part c, addressed the need for a margin on the 15 percent blockage limit to account for errors and potential frost hardening. The staff notes that with the application of the statistical methodology described in response to RAI 1, the percentage blockage indicated by the mean value of the 54 channel inspection sample size, as shown by the tables in reference 5, must be less than 15 percent, since the mean value plus the standard error component must be $\leq$ 15 percent. The staff concludes that in conjunction with the discussion provided for frost in Section 3.2 below, this concern is resolved.

The staff requested additional information on several aspects of how the amount of flow blockage would be determined during an inspection. TVA's response to RAIs 3 and 4 describes a process where the flow passages are inspected from above and below, with a light source, with the observed blockage being assigned a value from 0 (a clear channel) to 100 percent blocked in increments of 25 percent. The results are then combined for comparison to the acceptance criterion, as discussed in the response to RAI 1. TVA also indicated that procedures that involved (a) a trained examiner, (b) high intensity lighting, and (c) visual acuity standards that meet or exceed the VT-2 requirements specified in American Society of Mechanical Engineers, Section IX, IWA 2300, "Qualification of Nondestructive Examination personnel," would be acceptable. On the basis of a conversation with TVA WBN licensing staff (R. N. Mays) on June 5, 2000, it is understood that these three criteria will be utilized for inspections at WBN with the recognition that alternate equivalent methods may be proposed and justified at other plants. The staff concludes that, on the basis discussed above, this concern is resolved for the WBN plant.

3.2 Frost Buildup as Flow Blockage

The previous SR 3.6.11.4 required that the accumulation of ice or frost would be inspected and compared to the acceptance criterion. The proposed change deletes frost from the SR and adds a definition of frost to the Bases to explain why frost is not an impediment to air/steam flow through the ice condenser.

The staff requested additional information in RAIs 5 and 6. TVA responded that frost would be distinguished from ice and that if a distinction could not be made between frost versus ice or loose versus fixed obstructions, then the obstruction would be classified as ice and treated as blockage. In response to RAI 6, TVA describes the processes that form ice versus those that form frost and takes the position that management of ice condenser maintenance activities has limited the potential for frost conversion to solid ice to the refueling outage. While the staff agrees in general with TVA's conclusions, the staff does not believe that ice condenser operations exclude, in their entirety, the potential for some frost to ice conversion during an operating cycle. This can be due to localized problems such as ice condenser doors or cooling

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[1]However, the staff does note an error in the Westinghouse letter's equation for the sample variance in that the (1-n/N) term should be followed by a bracket symbol so that it operates on the entire remainder of the numerator. The attached tables were found to have been produced with the correct version of the equation. An error of a similar nature was also made in TVA's letter of January 31, 2000 in that the right hand square bracket should follow the $(P')^2$ term.

system problems and to formation on the outer and inner walls. The staff believes that this phenomena can be adequately addressed by appropriate ice condenser maintenance practices, as discussed in TVA's response.

TVA also indicated that permanent blockage from components above the top if the ice bed would not be counted as blockage since the flow area is much larger in this area than in the flow passage region. This response is consistent with the discussion on the definition of the locations in a flow channel provided in Section 3.3 below and is acceptable.

3.3 Definition of the Locations Included in a Flow Channel Blockage Inspection

The scope for a visual inspection of the flow channels in the Bases for SR 3.6.11.4 has been changed to include the flow channel area between the ice baskets and past lattice frames and wall panels. This area is the limiting area for flow through the ice bed. This flow area is graphically represented by the sketch in TVA's January 31, 2000, submittal, Enclosure 2, page 1. The principle effect of this change is to remove the much larger flow areas in the regions of the upper deck grating and the lower inlet plenum and turning vanes from the flow channel area definition. TVA states that past practice has shown that removal of ice from these larger structures during the refueling outages is sufficient to ensure their operability. Accordingly TVA indicates that plant procedures will now require a 100 percent inspection and evaluation for any gross ice buildup on the excluded structures, and the removal of identified ice and has provided a specific licensee commitment to this effect.

This issue has been the subject of previous NRC staff review (reference 1). In that review, it was determined that inspection, during an operating cycle, of the larger components such as the lower inlet plenum and associated components, such as the turning vanes, is not necessary to meet the intent of the SR. In that evaluation it was recognized that "The lower inlet plenum and associated components (such as the turning vanes) represent a relatively large free volume, such that the available flow area is not significantly affected by any localized frost/ice buildup within the volume. Specifically, the available flow area in the lower inlet plenum is typically 10 to 100 times the flow area within the ice basket matrix. Hence, the literal application of the subject SR to the lower inlet plenum region has no significant physical basis."

The staff finds the licensee's proposed changes to the Bases to be consistent with the results of the earlier referenced NRC staff review, and for the reasons stated above, to be acceptable.

3.4 TS 3.6.12 Bases - ACTION B Entry Not Required for Routine Activities

Although the principle purpose of the licensee's application was to propose changes for the flow channel inspection, TVA has also proposed a change to the Bases for SR 3.6.12, Ice Condenser Doors. The change would add a note to the Bases as follows:

> Note: Entry into Condition B is not required due to personnel standing on or opening an intermediate deck or upper deck door for short durations to perform required surveillances, minor maintenance such as ice removal, or routine tasks such as system walkdowns.

TS 3.6.12 Condition B provides the required actions for intermediate deck and lower inlet doors when conditions challenging door operability such as a door being found open or incapable of full closure are found. TVA states that such conditions are not applicable for routine activities, such as opening doors to test whether they are physically restrained, conducting minor maintenance activities or performing system walkdowns. TVA characterizes these routine activities as involving a small number of personnel and being of a duration that is much less than the four hour frequency of Required Action B.1. TVA then concludes that such routine activities do not adversely affect ice bed sublimation, melting, or ice condenser flow paths. Subject to such activities being routine operability maintenance activities of short duration and involving few personnel and not impacting ice bed operability, as described in TVA's submittal, the staff finds the addition of the above stated Note to the TS 3.6.12 Bases to be acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in Title 10, *Code of Federal Regulations* (10 CFR), Part 20 and changes SRs. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (64 FR 70093, dated December 15, 1999). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (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.

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Date: July 17, 2000

References:

1. Letter, F. Rinaldi, NRC to H. B. Barron, Duke Energy Corporation, "Issuance of Amendments - McGuire Nuclear Station, Units 1 and 2 (TAC Nos. MA3284 and MA3285), dated September 10, 1998, relaxing the visual inspection frequency of the lower plenum support structures and turning vanes to once per 18 months.

2. Letter, Peter S. Tam, NRC to G. R Peterson, Duke Energy Corporation, "Issuance of Amendments - Catawba Nuclear Station, Units 1 and 2", dated September 10, 1998, relaxing the visual inspection frequency of the lower plenum support structures and turning vanes to once per 18 months.

3. Letters, R. Gridley, TVA, to NRC dated July 27 and October 20, 1988, proposing a change to the TS for the Sequoyah Nuclear Plant to replace the visual inspection requirement using 0.38 inch with a surveillance program utilizing a 15 percent acceptance criteria.

4. Letter, S. Black, NRC, to O. Kingsley, TVA, dated January 30, 1989, transmitting Amendment Nos. 98 and 87 to Facility operating licenses for the SQN Units 1 and 2 plants in response to TVA's application of July 27, 1988, as supplemented October 20, 1988.

5. Letter T. A. Lordi, Westinghouse, to J. B. Hosmer, TVA, dated June 23, 1988, providing surveillance techniques for complying with SQN TS for inspection of ice basket flow passages. (ADAMS # ML003723860)

6. NUREG-1475, "Applying Statistics", by D. Lurie, NRC, and R. H. Moore, Bonneville Power Administraiton, February 1994.

7. NUREG/CR-4604, "Statistical Methods for Nuclear Material Management", by W. Bowen and C. A. Bennett, Pacific Northwest Laboratory, December 1988.

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