ENCLOSURE 1

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-02)

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3/4.6.5 ICE CONDENSER

ICE BED

LIMITING CONDITION FOR OPERATION

3.6.5.1. The ice bed shall be OPERABLE with:

a. The stored ice having a boron concentration of at least 1800 ppm boron as sodium tetraborate and a pH of 9.0 to 9.5,

b. Flow channels through the ice condenser,

c. A maximum ice bed temperature of less than or equal 27°F,

d. A total ice weight of at least ~~2,245,320~~ 2,082,024 pounds at a 95% level of confidence, and R135

e. 1944 ice baskets. R7

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the ice bed inoperable, restore the ice bed to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.5.1 The ice condenser shall be determined OPERABLE:

a. At least once per 12 hours by using the ice bed temperature monitoring system to verify that the maximum ice bed temperature is less than or equal to 27°F.

b. At least once per 12 months by: R135

1. Chemical analyses which verify that at least 9 representative samples of stored ice have a boron concentration of at least 1800 ppm as sodium tetraborate and a pH of 9.0 to 9.5 ~~at 20°C~~.

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SURVEILLANCE REQUIREMENTS (Continued)

4. Verifying, by visual inspection of a representative random sample of at least 54 flow passages (33 percent) per ice condenser bay, that the accumulation of frost or ice on flow passages between ice baskets, past lattice frames, through the intermediate and top deck floor grating, or past the lower inlet plenum support structures and turning vanes is less than or equal to 15-percent blockage of the total flow area in each bay, with a 95-percent level of confidence. R135 R102

   If the summation of blockage from the sample fails to meet the acceptance criteria, then 100 percent of the passages of that bay shall be inspected. If the 100-percent inspection fails to meet the acceptance criteria, then the flow passages shall be cleaned to meet the acceptance criteria. Each flow passage that is cleaned will be reinspected. Any inaccessible flow passage that is not inspected will be considered blocked.

c. At least once per 40 months by lifting and visually inspecting the accessible portions of at least two ice baskets from each 1/3 of the ice condenser and verifying that the ice baskets are free of detrimental structural wear, cracks, corrosion or other damage. The ice baskets shall be raised at least 10 feet for this inspection.

d. At least once per 18 months by: R135

2. Weighing a representative sample of at least 144 ice baskets and verifying that each basket contains at least ~~1155~~ 1071 lbs of ice. The representative sample shall include 6 baskets from each of the 24 ice condenser bays and shall be constituted of one basket each from Radial Rows 1, 2, 4, 6, 8 and 9 (or from the same row of an adjacent bay if a basket from a designated row cannot be obtained for weighing) within each bay. If any basket is found to contain less than ~~1158~~ 1071 pounds of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The minimum average weight of ice from the 20 additional baskets and the discrepant basket shall not be less than ~~1185~~ 1071 pounds/basket at a 95% level of confidence. R135

   The ice condenser shall also be subdivided into 3 groups of baskets, as follows: Group 1 - bays 1 through 8, Group 2 - bays 9 through 16, and Group 3 - bays 17 through 24. The minimum average ice weight of the sample baskets from Radial Rows 1, 2, 4, 6, 8 and 9 in each group shall not be less than ~~1158~~ 1071 pounds/basket at a 95% level of confidence. R135

   The minimum total ice condenser ice weight at a 95% level of confidence shall be calculated using all ice basket weights determined during this weighing program and shall not be less than ~~2,245,320~~ 2,082,024 pounds. R135

3/4.6.4 COMBUSTIBLE GAS CONTROL

The OPERABILITY of the equipment and systems required for the detection and control of hydrogen gas ensures that this equipment will be available to maintain the hydrogen concentration within containment below its flammable limit during post-LOCA conditions. Either recombiner unit or the hydrogen mitigation system, consisting of 68 hydrogen ignitions per unit, is capable of controlling the expected hydrogen generation associated with 1) zirconium-water reactions, 2) radiolytic decomposition of water and 3) corrosion of metals within containment. These hydrogen control systems are designed to mitigate the effects of an accident as described in Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a LOCA", Revision 2 dated November 1978. The hydrogen monitors of Specification 3.6.4.1 are part of the accident monitoring instrumentation in Specification 3.3.3.7 and are designated as Type A, Category 1 in accordance with Regulatory Guide 1.97, Revision 2, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," December 1980. BR R15

The hydrogen mixing systems are provided to ensure adequate mixing of the containment atmosphere following a LOCA. This mixing action will prevent localized accumulations of hydrogen from exceeding the flammable limit.

The operability of at least 66 of 68 ignitors in the hydrogen mitigation system will maintain an effective coverage throughout the containment. This system of ignitors will initiate combustion of any significant amount of hydrogen released after a degraded core accident. This system is to ensure burning in a controlled manner as the hydrogen is released instead of allowing it to be ignited at high concentrations by a random ignition source. BR

3/4.6.5 ICE CONDENSER

The requirements associated with each of the components of the ice condenser ensure that the overall system will be available to provide sufficient pressure suppression capability to limit the containment peak pressure transient to less than 12 psig during LOCA conditions.

3/4.6.5.1 ICE BED

The OPERABILITY of the ice bed ensures that the required ice inventory will 1) be distributed evenly through the containment bays, 2) contain sufficient boron to preclude dilution of the containment sump following the LOCA and 3) contain sufficient heat removal capability to condense the reactor system volume released during a LOCA. These conditions are consistent with the assumptions used in the accident analyses.

The minimum weight figure of 1258 (1071) pounds of ice per basket contains a 15% conservative allowance for ice loss through sublimation which is a factor of 15 higher than assumed for the ice condenser design. The minimum weight figure of 2,245,320 (2,082,024) pounds of ice also contains an additional 1% conservative allowance to account for systematic error in weighing instruments. In the R135 R135

Amendment No. 4, 5, 131, 149
Revised 08/18/87

December 7, 1990

DEC 07 1990

3/4.6.5 ICE CONDENSER

ICE BED

LIMITING CONDITION FOR OPERATION

3.6.5.1 The ice bed shall be OPERABLE with:

a. The stored ice having a boron concentration of at least 1800 ppm boron as sodium tetraborate and a pH of 9.0 to 9.5,

b. Flow channels through the ice condenser,

c. A maximum ice bed temperature of less than or equal to 27°F,

d. A total ice weight of at least ~~2,245,320~~ 2,082,024 pounds at a 95% level of confidence, and R118

e. 1944 ice baskets.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the ice bed inoperable, restore the ice bed to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.5.1 The ice condenser shall be determined OPERABLE:

a. At least once per 12 hours by using the ice bed temperature monitoring system to verify that the maximum ice bed temperature is less than or equal to 27°F.

b. At least once per 12 months by: R118

1. Chemical analyses which verify that at least 9 representative samples of stored ice have a boron concentration of at least 1800 ppm as sodium tetraborate and a pH of 9.0 to 9.5 ~~at 20°C~~.

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SURVEILLANCE REQUIREMENTS (Continued)

[4] Verifying, by visual inspection of a representative random sample of at least 54 flow passages (33 percent) per ice condenser bay, that the accumulation of frost or ice on flow passages between ice baskets, past lattice frames, through the intermediate and top deck floor grating, or past the lower inlet plenum support structures and turning vanes is less than or equal to 15-percent blockage of the total flow area in each bay, with a 95-percent level of confidence. R118

If the summation of blockage from the sample fails to meet the acceptance criteria, then 100 percent of the passages of that bay shall be inspected. If the 100-percent inspection fails to meet the acceptance criteria, then the flow passages shall be cleaned to meet the acceptance criteria. Each flow passage that is cleaned will be reinspected. Any inaccessible flow passage that is not inspected will be considered blocked. R87

c. At least once per 40 months by lifting and visually inspecting the accessible portions of at least two ice baskets from each 1/3 of the ice condenser and verifying that the ice baskets are free of detrimental structural wear, cracks, corrosion or other damage. The ice baskets shall be raised at least 10 feet for this inspection.

d. At least once per 18 months by: R118

[2.] Weighing a representative sample of at least 144 ice baskets and verifying that each basket contains at least [1155] lbs of ice. The representative sample shall include 6 baskets from each of the 24 ice condenser bays and shall be constituted of one basket each from Radial Rows 1, 2, 4, 6, 8 and 9 (or from the same row of an adjacent bay if a basket from a designated row cannot be obtained for weighing) within each bay. If any basket is found to contain less than [1369] pounds of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The minimum average weight of ice from the 20 additional baskets and the discrepant basket shall not be less than [1358] pounds/basket at a 95% level of confidence. R118 R118 R118 R118 R118

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The ice condenser shall also be subdivided into 3 groups of baskets, as follows: Group 1 - bays 1 through 8, Group 2 - bays 9 through 16, and Group 3 - bays 17 through 24. The minimum average ice weight of the sample baskets from Radial Rows 1, 2, 4, 6, 8 and 9 in each group shall not be less than [1235] pounds/basket at a 95% level of confidence. R118

The minimum total ice condenser ice weight at a 95% level of confidence shall be calculated using all ice basket weights determined during this weighing program and shall not be less than [1 245 328] pounds. R118

2,082,024

3/4.6.4 COMBUSTIBLE GAS CONTROL

The OPERABILITY of the equipment and systems required for the detection and control of hydrogen gas ensures that this equipment will be available to maintain the hydrogen concentration within containment below its flammable limit during post-LOCA conditions. Either recombiner unit or the hydrogen mitigation system, consisting of 68 hydrogen igniters per unit, is capable of controlling the expected hydrogen generation associated with 1) zirconium-water reactions, 2) radiolytic decomposition of water and 3) corrosion of metals within containment. These hydrogen control systems are designed to mitigate the effects of an accident as described in Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a LOCA," Revision 2, dated November 1978. The hydrogen monitors of Specification 3.6.4.1 are part of the accident monitoring instrumentation in Specification 3.3.3.7 and are designated as Type A, Category 1 in accordance with Regulatory Guide 1.97, Revision 2, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant Conditions During and Following an Accident," December 1980. BR R13

The hydrogen mixing systems are provided to ensure adequate mixing of the containment atmosphere following a LOCA. This mixing action will prevent localized accumulations of hydrogen from exceeding the flammable limit.

The operability of at least 66 of 68 igniters in the hydrogen control distributed ignition system will maintain an effective coverage throughout the containment. This system of ignitors will initiate combustion of any significant amount of hydrogen released after a degraded core accident. This system is to ensure burning in a controlled manner as the hydrogen is released instead of allowing it to be ignited at high concentrations by a random ignition source. BR

3/4.6.5 ICE CONDENSER

The requirements associated with each of the components of the ice condenser ensure that the overall system will be available to provide sufficient pressure suppression capability to limit the containment peak pressure transient to less than 12 psig during LOCA conditions.

3/4.6.5.1 ICE BED

The OPERABILITY of the ice bed ensures that the required ice inventory will 1) be distributed evenly through the containment bays, 2) contain sufficient boron to preclude dilution of the containment sump following the LOCA and 3) contain sufficient heat removal capability to condense the reactor system volume released during a LOCA. These conditions are consistent with the assumptions used in the accident analyses.

The minimum weight figure of ~~1255~~ 1071 pounds of ice per basket contains a 15% conservative allowance for ice loss through sublimation which is a factor of 15 higher than assumed for the ice condenser design. The minimum weight figure of ~~2,245,320~~ 2,082,024 pounds of ice also contains an additional 1% conservative allowance to account for systematic error in weighing instruments. In the R118 R118

ENCLOSURE 2

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-02)

DESCRIPTION AND JUSTIFICATION FOR

ICE CONDENSER ICE WEIGHT REDUCTION

Description of Change

TVA proposes to modify the Sequoyah Nuclear Plant (SQN) Units 1 and 2 technical specifications (TSs) to revise TS 3.6.5.1.d and Surveillance Requirement (SR) 4.6.5.1.d to lower SQN's minimum TS basket weight from 1,155 pounds (lbs) to 1,071 lbs, thus lowering the overall ice condenser weight from 2,245,320 lbs to 2,082,024 lbs. Additionally, SR 4.6.5.1.b.1 (chemical analysis) will be transferred to SR 4.6.5.1.d, which will allow for the extension of the surveillance interval from 12 months to 18 months. This SR extension is consistent with the guidance provided in Generic Letter (GL) 93-05. The "20°C" test requirement will also be deleted.

Reason for Change

TVA is requesting a revision of TS 3.6.5.1.d and SR 4.6.5.1.d to reduce the minimum TS ice basket weight to provide increased plant availability through reduced plant refueling outage time. Since it is easier to maintain lower ice weights, TVA will be able to more efficiently manage its maintenance manpower. Revised design basis analyses performed by Westinghouse Electric Corporation, using staff approved modeling enhancements, have shown that the amount of ice required for accident mitigation may be reduced without decreasing safety margins. TVA proposes to incorporate the results of the Westinghouse analyses into the plant design basis.

The present SR requires that a chemical analysis be performed every 12 months. By extending this interval to 18 months, the SR may be performed during refueling outages. This also allows for more efficient management of manpower and exposure reduction since the containment entries will not be made at power for sampling.

The removal of the "20°C" test requirement will facilitate testing the pH level at a different temperature.

Justification for Changes

SR 4.6.5.1.d currently requires that each basket contain at least 1,155 lbs of ice and that the average ice weight for each bay and each group-row combination not be less than 1,155 lbs per basket at a 95 percent level of confidence at the start of the surveillance interval. SQN's current 1,155 lbs TS limit is based on a containment analysis that assumes an even distribution of 993 lbs per basket throughout the ice condenser. The 1,155 lbs per basket TS limit contains a conservative allowance for ice loss through sublimation during the surveillance interval and a conservative allowance for ice-weighing instrument error. These values are currently 15 percent and 1 percent, respectively. The above limits ensure, at a 95 percent level of confidence, a minimum total ice weight of 2,245,320 lbs is present at the start of the surveillance interval. A revised containment analysis (refer to Enclosure 4, Westinghouse WCAP-12455, Revision 1) utilizing new mass and energy releases (refer to Westinghouse WCAP-10325-P-A) results in an increase in the current peak containment pressure with the proposed reduced TS ice weight. The current containment analysis using the TS ice weight yields a peak containment pressure of 10.9 pounds per square inch (psi) following a design-basis, loss-of-coolant accident (LOCA). The revised containment analysis, utilizing the revised mass and energy

model and an ice weight of 922 lbs per basket, predicts a peak design basis LOCA containment pressure of 11.45 psi. This calculated peak pressure is below the containment design pressure limit of 12 psi. Utilizing a 15 percent margin to bound expected sublimation over one cycle with an additional 1 percent to account for instrument error, the minimum basket weight will be: 922 x 1.15 x 1.01 = 1,071 lbs.

This value will further translate into a total TS weight of 2,082,024 lbs at a 95 percent level of confidence. The current method for determining the 95 percent level of confidence will remain the same. It can be concluded, based on the revised containment analysis, that sufficient ice will be present at the end of an 18-month cycle to ensure that in the event of a LOCA, containment design pressure will not be exceeded. Although the current margin between the design pressure and the peak LOCA pressure will be slightly reduced, the margin of safety provided by the containment design is not reduced. Thus, justification exists for reducing the overall ice weight required in the ice condenser. Note, on January 12, 1990, SQN previously submitted a similar TS change request 90-05 to reduce the ice weight. It was approved on March 2, 1990 (TAC Nos. 75753 and 75754).

NUREG-1366 indicated that another ice condenser nuclear plant has not identified a problem in meeting the boron concentration or pH requirements when analyzed every 9 months. At SQN, the surveillance interval is 12 months and past analyses have not indicated problems meeting the boron concentration or pH requirements. Because the SR interval is every 12 months, it will not always fall during a refueling outage; therefore, the requirement will cause a person to enter containment during power operation and receive a radiation dose. This change is recommended by GL 93-05 and is consistent with NUREG-1431, Revision 1, "Standard Technical Specifications, Westinghouse Plants." Based on SQN's operating experience being compatible with this TS change, reduced radiation dose, and outside industry experience, it is justified to extend the surveillance interval to 18 months as it applies to the ice bed chemical analysis requirements.

An additional item that was a result of NUREG-1431 is the deletion of the "20°C" testing requirement in the present SR 4.6.5.1.b.1. The normal recommended temperature to test liquids established in the Annual Book Of American Society for Testing and Materials Standards is 25°C. Eliminating the temperature at which the pH is determined from the TSs allows testing to be performed at the current recommended testing criteria. The elimination of this excessive criteria also provides consistency with NUREG-1431, Revision 1.

Environmental Impact Evaluation

The proposed change does not involve an unreviewed environmental question because operation of SQN Units 1 and 2 in accordance with this change would not:

1. Result in a significant increase in any adverse environmental impact previously evaluated in the Final Environmental Statement (FES) as modified by NRC's testimony to the Atomic Safety and Licensing Board, supplements to the FES, environmental impact appraisals, or decisions of the Atomic Safety and Licensing Board.

2. Result in a significant change in effluents or power levels.

3. Result in matters not previously reviewed in the licensing basis for SQN that may have a significant environmental impact.

ENCLOSURE 3

PROPOSED TECHNICAL SPECIFICATION CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-02)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

ICE CONDENSER ICE WEIGHT REDUCTION

Significant Hazards Evaluation

TVA has evaluated the proposed technical specification (TS) change and has determined that it does not represent a significant hazards consideration based on criteria established in 10 CFR 50.92(c). Operation of Sequoyah Nuclear Plant (SQN) in accordance with the proposed amendment will not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   TVA proposes to modify the SQN Unit 1 and Unit 2 TSs to revise Surveillance Requirement (SR) 4.6.5.1.d to lower SQN's minimum TS basket weight from 1,155 pounds (lbs) to 1,071 lbs, thus lowering the overall ice condenser weight from 2,245,320 lbs to 2,082,024 lbs.

   The ice condenser system is provided to absorb thermal energy release following a loss-of-coolant accident (LOCA) or high energy line break (HELB) and to limit the peak pressure inside containment. The current containment analysis for SQN is based on a minimum of 993 lbs of ice per basket evenly distributed throughout the ice condenser at the end of an 18-month refueling cycle. The revised containment analysis shows that for the predicted sublimation rate of 15 percent for 18 months, an average basket weight of 922 lbs at the end of the 18-month period would ensure containment design pressure is not exceeded.

   Based on TVA's evaluation and the revised containment analysis, TVA considers the reduction of ice weight to be acceptable for satisfying the safety function of the ice condenser for an 18-month ice-weighing interval. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

   TVA is also proposing to extend the surveillance interval as it pertains to the ice bed chemical analysis. Based on test results, both at SQN and the industry, the average boron concentration and pH changes are minimal; therefore, this change does not involve an increase in the probability or consequences of an accident previously evaluated.

   Elimination of the temperature at which the pH of the ice bed is determined is an administrative change. Future testing will be accomplished in accordance with American Society for Testing and Materials (ASTM) Standards recommendations. Therefore, this change cannot increase the probability of an accident and the consequences of an accident will not increase.

2. Create the possibility of a new or different kind of accident from any previously analyzed.

   TVA's request to lower the TS limit for ice weight at the start of the surveillance interval will not result in a new or different kind of accident from that previously analyzed in SQN's Final Safety Analysis Report. SQN's ice condenser serves to limit the peak pressure inside containment following a LOCA. TVA has evaluated the revised containment pressure analysis for SQN

(Enclosure 4, Westinghouse WCAP-12455, Revision 1) and determined that sufficient ice would be present at all times to keep the peak containment pressure below SQN's containment design pressure of 12 pounds per square inch gage (psig). Therefore, this change would not result in a new or different kind of accident from any previously analyzed.

The proposed reduced testing frequency of the chemical composition of the ice bed does not change the manner in which the plant is operated. Additionally, the ice condenser is a passive system that reacts to an accident, but does not support plant operation on a daily basis. The reduced testing frequency of the ice bed chemical composition does not generate any new accident precursors; therefore, the possibility of a new or different kind of accident previously analyzed is not created.

Elimination of the temperature at which the pH of the ice bed is determined is an administrative change. This change cannot create the possibility of a new or different kind of accident.

3. Involve a significant reduction in a margin of safety.

The ice condenser system is provided to absorb thermal energy release following a LOCA and to limit the peak pressure inside containment. The current ice condenser analysis for SQN is based on a minimum of 993 lbs of ice per basket. The revised containment analysis changes the minimum ice weight assumed in the analysis to 922 lbs per basket.

The revised containment analysis shows that using an average basket weight of 1,071 lbs and a sublimation allowance of 15 percent, all bays would have an average basket weight of 922 lbs at the end of the 18-month surveillance interval. The revised analysis utilizes new mass and energy releases (refer to Westinghouse WCAP-10325-P-A), which substantially delays ice-bed meltout and limits the initial containment peak pressure to approximately 7.15 psig during the blowdown phase. The ice-bed meltout delay allows the second containment pressure peak, which is driven mainly by the decay heat, to be limited to approximately 11.45 psig, which is below the containment design pressure of 12 psig.

Based on TVA's evaluation and the revised containment analysis, TVA considers the reduction of the average basket weight to be acceptable for satisfying the safety function of the ice condenser for the current 18-month interval. Therefore, the proposed change does not involve a significant reduction in the margin of safety.

The proposal to extend the surveillance from 12 to 18 months does not change the boron concentration or pH requirements. Experience at Duke Power Company, as stated in NUREG-1366, indicates that these parameters do not

change appreciably when verified every 9 months. SQN has a similar experience with a 12-month interval. Since the boron concentration and the post-LOCA pH requirements remain essentially the same, there is no reduction in the margin of safety.

Elimination of the temperature at which the pH of the ice bed is determined is an administrative change. Future testing will be accomplished in accordance with ASTM recommendations. The difference between the pH values determined at the current TS specified temperature and the temperature currently recommended by the ASTM standards is insignificant. Therefore, there is no reduction in the margin of safety.

ENCLOSURE 4

PROPOSED TECHNICAL SPECIFICATION CHANGE

SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-96-02)

WESTINGHOUSE ELECTRIC CORPORATION

COMMERCIAL ATOMIC POWER (WCAP) 12455, REVISION 1

CONTAINMENT INTEGRETY ANALYSIS FOR ICE

WEIGHT OPTIMIZATION ENGINEERING REPORT