Industry/TSTF Standard Technical Specification Change Traveler

Clarify the Ice Basket 20 Basket Weight Criteria

Classification: 1) Correct Specifications

NUREGs Affected: ☐ 1430 ☑ 1431 ☐ 1432 ☐ 1433 ☐ 1434

Description:

The proposed change will move the criteria for selecting an additional 20 ice baskets for weighing if one of the randomly selected baskets weight falls below the Technical Specification (TS) required minimum from the bases to the TS Surveillance Requirement (SR). This criterion was included in the TS SR in Phase II of the WOG Merit TS's and was moved to the bases in Phase III. Additionally, the wording of the SR will be revised to eliminate any confusion over the TS SR statement that "each" ice basket contains greater than or equal to [1400] lb of ice since it will provide, as a part of the TS SR, the steps to take if one or more baskets are identified weighing less than the required minimum and that the weight requirements are for the beginning of the operating cycle. Finally, the surveillance frequency will be revised from 9 months to 18 months which will then be in accordance with the majority of the ice condenser plants surveillance frequencies.

Justification:

The basic requirement for the ice weight in the ice condenser is to ensure a sufficient mass of ice is available to condense the steam produced by a LOCA thus ensuring the peak containment pressure is maintained below design limits following a design basis accident (DBA). A specified value of ice for each ice basket is required to provide an even distribution of ice in the ice condenser. The requirement to weigh additional baskets from the same bay in which one or more ice baskets were identified as being below the minimum specified weight ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early meltout during a DBA transient, creating a path for steam to pass through the ice condenser without being condensed. Placing the statement requiring the sampling of 20 additional baskets in a bay in the TS SR does not result in a reduction in the requirements associated with the ice condenser. Instead, this will ensure a common understanding and implementation of the requirements when an ice basket is identified as being underweight. At present, the TS SR only states that "each basket contain >= [1400] lb of ice." No guidance is provided in the TS as to what action to take for an underweight basket. The present wording could allow the incorrect interpretation that the ice condenser is inoperable when a single underweight basket is identified. Placing the previously described statement back into the TS and revising the remainder of the SR to clarify the wording would ensure a clear understanding of the actions necessary for identified underweight baskets. The clarification that the weight requirement is applicable to the beginning of the cycle does not change the present intent of the TS but ensures there is no confusion that the weight documented in the SR is the weight required at the beginning of the cycle since the weight at the end of the operating cycle may be less than this due to sublimation. This does not result in a change to the intent or implementation of the TS since a sublimation allowance was provided in the SR weight requirement.

The increase to an 18 month frequency does not result in an overall reduction in the end-of-cycle ice weight as long as either a plant specific analysis shows a sufficient margin of ice in the ice condenser to account for sublimation or the required minimum ice weight as specified in the SR is adjusted upward to account for the increased sublimation time. Either of these methods will allow for sublimation over the longer Surveillance interval without a decrease below the minimum required ice weight at the end of the operating cycle.

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Revision History

OG Revision 0 **Revision Status: Active** **Next Action: NRC**

Revision Proposed by: Sequoyah

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OG Revision 0 **Revision Status: Active** **Next Action: NRC**

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Affected Technical Specifications

SR 3.6.15.2	Ice Bed (Ice Condenser)
SR 3.6.15.2 Bases	Ice Bed (Ice Condenser)
SR 3.6.15.3	Ice Bed (Ice Condenser)
SR 3.6.15.3 Bases	Ice Bed (Ice Condenser)

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TSTF-335

Attachment 1
Technical Specification 3.6.15
No Significant Hazards Consideration

TSF-335

NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

[Utility Name] has concluded that operation of **[Plant Name]** Unit **[X]**, in accordance with the proposed change to the technical specifications [or operating license(s)], does not involve a significant hazards consideration. **[Utility Name]**'s conclusion is based on its evaluation, in accordance with 10 CFR 50.91(a)(1), of the three standards set forth in 10 CFR 50.92(c).

A. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed TS amendments discussed below can not increase the probability of occurrence of any analyzed accident because they are not the result or cause of any physical modification to the ice condenser structures, and for the current design of the ice condenser, there is no correlation between any credible failure and the initiation of any previously analyzed accident.

Regarding the consequences of analyzed accidents, the proposed amendment provides for the actions required if one or more ice condenser ice baskets are determined to weigh below the minimum specified value to be made a part of the TS surveillance requirement (SR) instead of being located in the bases. This ensures consistent interpretation of the requirements of the TS. The clarification of the response required if one or more ice baskets in a given bay is determined to be underweight ensures sufficient ice is maintained in each bay to prevent early meltout in a local zone following a DBA and that the required overall ice weight is maintained in the ice condenser. Additionally, the clarification that the weight requirement is applicable to the beginning of the cycle does not change the present intent of the TS but ensures there is no confusion, since the weight at the end of the operating cycle may be less than that specified in the SR due to sublimation. This does not result in a change to the intent or implementation of the TS since a sublimation allowance was provided in the original SR weight requirement. These clarifications do not result in any affect on plant equipment or operation and the actions taken during the implementation of the revised TS will be the same as prior to the revision. Therefore, the clarification of these requirements will not increase the consequences of any accident previously evaluated.

The proposed amendment also revises the Surveillance frequency from every 9 months to every 18 months such that it will coincide with refueling outages. The original ice weight requirements for the ice condenser Surveillance included a conservative allowance for ice loss through sublimation to ensure the design weight lower limit was not exceeded during the Surveillance interval. Verification that sufficient ice is maintained in the ice condenser is performed at the beginning of each operating cycle to ensure the design minimum weight limit is not exceeded at the end of the interval. Therefore, increasing the Surveillance frequency does not affect the ice condenser operation or accident response since sufficient ice is maintained to address the limiting design basis accident(s) (DBAs) and the proposed amendment will not increase the consequences of any accident previously evaluated.

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

The inclusion of the action required for an underweight ice basket in the TS SR, instead of in the bases of the TS, provides for the consistent interpretation of the requirement. The clarification of the response required if one or more ice baskets in a given bay is determined to be underweight ensures sufficient ice is maintained in each bay to prevent early meltout in a local zone following a DBA and that the required overall ice weight is maintained in the ice condenser. Additionally, the clarification that the weight requirement is applicable to the beginning of the cycle does not change the present intent of the TS but ensures there is no confusion, since the weight at the end of the operating cycle may be less than that specified in the SR due to sublimation. This does not result in a change to the intent or implementation of the TS since a sublimation allowance was provided in the original SR weight requirement. The operation and maintenance of the ice condenser and its associated equipment will not change as a result of these clarifications. Therefore, the implementation of these clarifications will not create the possibility of accidents or equipment malfunctions of a new or different kind from any previously evaluated.

The proposed amendment also revises the Surveillance

frequency from every 9 months to every 18 months such that it will coincide with refueling outages. The original ice weight requirements for the ice condenser Surveillance included a conservative allowance for ice loss through sublimation to ensure the design minimum weight limit was not exceeded during the Surveillance interval. The proposed amendment ensures an adequate amount of ice is maintained in the ice condenser by either an increase in the required ice weight to address the increased sublimation time or by a plant specific analysis justifying the allowed weight, thus ensuring the design weight lower limit is not exceeded at the end of the interval. The ice condenser serves to limit the peak pressure inside containment following a Loss of Cooling Accident (LOCA) and sufficient ice would be available at all times to keep the peak containment pressure below the design limit. Therefore, increasing the Surveillance frequency will not affect the ice condenser operation or accident response since sufficient ice is maintained to address the limiting DBAs and the proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

The proposed amendment allows for the consistent interpretation of the required actions if an ice basket is determined to weigh less than the required minimum. The inclusion of these actions in the TS SR instead of in the TS bases assures the correct actions will be taken as intended by the TSs. The clarification of the response required if one or more ice baskets in a given bay is determined to be underweight ensures sufficient ice is maintained in each bay to prevent early meltout in a local zone following a DBA and that the required overall ice weight is maintained in the ice condenser. Additionally, the clarification that the weight requirement is applicable to the beginning of the cycle does not change the present intent of the TS but ensures there is no confusion, since the weight at the end of the operating cycle may be less than that specified in the SR due to sublimation. This does not result in a change to the intent or implementation of the TS since a sublimation allowance was provided in the original SR weight requirement. The proposed clarifications do not result in or have any affect on the operation or maintenance of any plant equipment.

Thus the design limits for the continued safe function of the containment structure following a DBA are not exceeded due to this change and therefore the proposed amendment does not involve a reduction in a margin of safety.

The ice condenser system is provided to absorb thermal energy releases following a LOCA and to limit the peak pressure inside containment. The containment analysis shows that the proposed amendment to revise the Surveillance frequency from every 9 months to every 18 months will not result in an increase to the peak containment pressure following a LOCA since the minimum ice weight limit has also been adequately addressed ensuring that sufficient ice is available at the end of the Surveillance interval. Therefore, increasing the Surveillance frequency will not affect the ice condenser operation or accident response since sufficient ice is maintained to address the limiting DBAs and the design limits for the continued safe function of the containment structure following a DBA are not affected. For these reasons, the proposed amendment does not involve a reduction in a margin of safety.

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.

Insert A

TSTF-3

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.6.15.2	Verify total weight of stored ice at the beginning of each operating cycle is >= [2,721,600] lb by: a. Weighing a representative sample of >= 144 ice baskets and ~~verifying each basket contains >= [1400] lb of ice; and~~ b. Calculating total weight of stored ice, at a 95% confidence level, using all ice basket weights determined in SR 3.6.15.2.a.	~~9~~ months [18]
SR 3.6.15.3	Verify azimuthal distribution of ice at a 95% confidence level by subdividing weights, as determined by SR 3.6.15.2.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 >= [1400] lb.	~~9~~ months [18]
SR 3.6.15.4	Verify, by visual inspection, accumulation of ice or frost on structural members comprising flow channels through the ice condenser is <= [0.38] inch thick.	9 months

DELETE

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.15.1 (continued)

temperature condition. This SR may be satisfied by use of the Ice Bed Temperature Monitoring System.

SR 3.6.15.2

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

Insert B

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

Delete

Delete

If a basket is found to contain < [1400] lb of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The average weight of ice in these 21 baskets (the discrepant basket and the 20 additional baskets) shall be >= [1400] lb at a 95% confidence level.

Insert C

Weighing 20 additional baskets from the same bay in the event a Surveillance reveals that a single basket contains < [1400] lb ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a DBA transient, creating a path for steam to pass through the ice bed without being condensed. The Frequency of 9 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 9 month Frequency, the weight requirements are maintained with no significant degradation between surveillances

one or more baskets

[18]

Insert D

(continued)

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.6.15.3

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 9 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 9 month Frequency, the weight requirements are maintained with no significant degradation between surveillances. [18]

SR 3.6.15.4

This SR ensures that the flow channels through the ice condenser have not accumulated an excessive amount of ice or frost blockage. The visual inspection must be made for two or more flow channels per ice condenser bay and must include the following specific locations along the flow channel:

a. Past the lower inlet plenum support structures and turning vanes;

b. Between ice baskets;

c. Past lattice frames;

d. Through the intermediate floor grating; and

e. Through the top deck floor grating.

The allowable [0.38] inch thick buildup of frost or ice is based on the analysis of containment response to a DBA with partial blockage of the ice condenser flow passages. If a flow channel in a given bay is found to have an accumulation of frost or ice > [0.38] inch thick, a representative sample of 20 additional flow channels from the same bay must be visually inspected.

If these additional flow channels are all found to be acceptable, the discrepant flow channel may be considered single, unique, and acceptable deficiency. More than one discrepant flow channel in a bay is not acceptable, however. These requirements are based on the sensitivity of the partial blockage analysis to additional blockage. The

(continued)

TSTF-27

Insert A

----------NOTE----------
If one or more baskets in an ice condenser bay are found to contain < [1400] lbs of ice, a representative sample of at least 20 additional baskets from the same bay shall be weighed. The average weight of ice in the baskets weighed in the specified bay shall be ≥ [1400] lbs at a [95]% confidence level.

Insert B

The selection criteria and methodology for the weighing of 144 ice condenser baskets was documented in two SERs issued for the licensing of the D. C. Cook Nuclear Facility. The first SER, issued as Supplement 5 of the original D. C. Cook SER on January 16, 1976 (Letter N76007), addressed the weighing of 96 ice baskets and defined the statistical methods for analyzing the data. The second SER was issued as letter N77016 on February 16, 1977 and addressed the reasons for increasing the sample size to 144 ice baskets.

Insert C

The total ice weight defined in this SR is the minimum required ice weight for the beginning of an operating cycle. A sublimation allowance has been provided to ensure sufficient ice is available at the end of the operating cycle for the ice condenser to perform its intended design function.

This SR has been modified by a note that indicates if one or more baskets are found to contain < [1400] lb of ice, a representative sample of at least 20 additional baskets from the same bay shall be weighed and that the average weight of ice in the baskets weighed in the specified bay (the discrepant basket(s), the remaining originally selected baskets, and the 20 additional baskets) shall be ≥ [1400] lb at a [95]% confidence level.

Insert D

The average weight figure of [1400] lbs of ice per basket contains either a conservative allowance for ice loss through sublimation which has been determined by plant specific analysis or a defined [15]% allowance. The minimum weight figure of [2,721,600] lbs of ice also contains an additional [1] % conservative allowance to account for systematic error in weighing instruments. In the event that observed sublimation rates are equal to or lower than design predictions after three years of operation, the minimum ice basket weights may be adjusted downward.

TSTF-3

Attachment 3
NUREG 1432, Revision 1
Technical Specification 3.6.15
Revised Pages

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.15.2	----------NOTE---------- If one or more baskets in an ice condenser bay are found to contain < [1400] lbs of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The average weight of ice in the baskets weighed in the specified bay shall be ≥ [1400] lbs at a [95]% confidence level. ---------- Verify total weight of stored ice at the beginning of each operating cycle is >= [2,721,600] lb by: a. Weighing a representative sample of >= 144 ice baskets and b. Calculating total weight of stored ice, at a 95% confidence level, using all ice basket weights determined in SR 3.6.15.2.a.	[18] months
SR 3.6.15.3	Verify azimuthal distribution of ice at a 95% confidence level by subdividing weights, as determined by SR 3.6.15.2.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 >= [1400] lb.	[18] months

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.15.4	Verify, by visual inspection, accumulation of ice or frost on structural members comprising flow channels through the ice condenser is <= [0.38] inch thick.	9 months
SR 3.6.15.5	Verify by chemical analyses of at least nine representative samples of stored ice: a. Boron concentration is >= [1800] ppm; and b. pH is >= [9.0] and <= [9.5].	18 months
SR 3.6.15.6	Visually inspect, for detrimental structural wear, cracks, corrosion, or other damage, two ice baskets from each azimuthal group of bays. See SR 3.6.15.3.	40 months

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.15.1 (continued)

temperature condition. This SR may be satisfied by use of the Ice Bed Temperature Monitoring System.

SR 3.6.15.2

The weighing program is designed to obtain a representative sample of the ice baskets. The representative sample shall include 6 baskets from each of the 24 ice condenser bays and shall consist of one basket from radial rows 1, 2, 4, 6, 8, and 9. If no basket from a designated row can be obtained for weighing, a basket from the same row of an adjacent bay shall be weighed. The selection criteria and methodology for the weighing of 144 ice condenser baskets was documented in two SERs issued for the licensing of the D. C. Cook Nuclear Facility. The first SER, issued as Supplement 5 of the original D. C. Cook SER on January 16, 1976 (Letter N76007), addressed the weighing of 96 ice baskets and defined the statistical methods for analyzing the data. The second SER was issued as letter N77016 on February 16, 1977 and addressed the reasons for increasing the sample size to 144 ice baskets.

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

The total ice weight defined in this SR is the minimum required ice weight for the beginning of an operating cycle. A sublimation allowance has been provided to ensure sufficient ice is available at the end of the operating cycle for the ice condenser to perform its intended design function.

This SR has been modified by a note that indicates if one or more baskets are found to contain < [1400] lb of ice, a representative sample of 20 additional baskets from the same bay shall be weighed and that the average weight of ice in the baskets weighed in the specified bay (the discrepant basket(s), the remaining originally selected baskets, and the 20 additional baskets) shall be ≥ [1400] lb at a [95]% confidence level. Weighing 20 additional baskets from the same bay in the event a Surveillance reveals that one or more baskets contains < [1400] lb ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a DBA transient, creating a path for steam to pass through the ice bed without being condensed. The Frequency of 18 months was based on ice storage tests and the allowance built into the required ice mass over and above the mass assumed in the safety analyses. The average weight figure of [1400] lbs of ice per basket contains either a conservative allowance for ice loss through sublimation which has been determined by plant specific analysis or a defined [15]% allowance which is a factor of [15] higher than assumed for the ice condenser design.

The minimum weight figure of [2,721,600] lbs of ice also contains an additional [1] % conservative allowance to account for systematic error in weighing instruments. In the event that observed sublimation rates are equal to or lower than design predictions after three years of operation, the minimum ice basket weights may be adjusted downward. Operating experience has verified that, with the 18 month Frequency, the weight requirements are maintained with no significant degradation between surveillances

(continued)

BASES

SURVEILLANCE REQUIREMENTS (Continued)

SR 3.6.15.3

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 3.6.15.4

This SR ensures that the flow channels through the ice condenser have not accumulated an excessive amount of ice or frost blockage. The visual inspection must be made for two or more flow channels per ice condenser bay and must include the following specific locations along the flow channel:

a. Past the lower inlet plenum support structures and turning vanes;

b. Between ice baskets;

c. Past lattice frames;

d. Through the intermediate floor grating; and

e. Through the top deck floor grating.

The allowable [0.38] inch thick buildup of frost or ice is based on the analysis of containment response to a DBA with partial blockage of the ice condenser flow passages. If a flow channel in a given bay is found to have an accumulation of frost or ice > [0.38] inch thick, a representative sample of 20 additional flow channels from the same bay must be visually inspected.

If these additional flow channels are all found to be acceptable, the discrepant flow channel may be considered single, unique, and acceptable deficiency. More than one discrepant flow channel in a bay is not acceptable, however. These requirements are based on the sensitivity of the partial blockage analysis to additional blockage. The

(continued)

Attachment 4
NUREG 1432,
Technical Specification 3.6.15
Information Only Pages

This Page is For Information Only and is Not Part of the Proposed TSTF

3.6 CONTAINMENT SYSTEMS

3.6.15 Ice Bed (Ice Condenser)

LCO 3.6.15 The ice bed shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Ice bed inoperable.	A.1 Restore ice bed to OPERABLE status.	48 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.15.1	Verify maximum ice bed temperature is <= [27]oF.	12 hours

(continued)