NUCLEAR ENERGY INSTITUTE

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June 23, 1999

Dr. William D. Beckner, Branch Chief
Technical Specifications Branch
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Forwarding of Revised TSTFs and New TSTFs

PROJECT NUMBER: 689

Dear Dr. Beckner:

Enclosed are 20 revised and eight new Technical Specification NUREGs NEI Technical Specification Task Force (TSTF) Travelers. This letter also transmits nine editorial changes and the status of all currently pending Technical Specification Bulletins (TSBs).

Revised travelers are TSTF-17, Rev. 2, TSTF-37, Rev. 2, TSTF-58, Rev. 1, TSTF-59, Rev 1, TSTF-107, Rev. 4, TSTF-169, Rev. 1, TSTF-197, Rev. 2, TSTF-204, Rev. 1, TSTF-207, Rev. 3, TSTF-230, Rev. 1, TSTF-262, Rev. 1, TSTF- 263, Rev. 2, TSTF-265, Rev. 1, TSTF-266, Rev. 1, TSTF-273, Rev. 1, TSTF-280, Rev. 1, TSTF-283, Rev. 1, TSTF-284, Rev. 2, TSTF-309, Rev. 2 and TSTF-316, Rev. 1. These travelers were modified as a result of feedback and discussions with NRC staff.

The new travelers are TSTF-333, Rev. 0, TSTF-334, Rev. 0, TSTF-335, Rev. 0, TSTF-336, Rev. 0, TSTF-337, Rev. 0, TSTF-338, Rev. 0, TSTF-339, Rev. 0 and TSTF-340, Rev. 0.

Also included in this transmittal are edits BWROG-ED-4, CEOG-ED-48, CEOG-ED-49, CEOG-ED-50, CEOG-ED-51, NRC-ED-13, NRC-ED-14, WOG-ED-18 and WOG-ED-19.

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Enclosure 3

TSB status is as follows:

- TSB-2, Rev. 0 has been included in TSTF-310.
- TSB-3, Rev. 0 has been processed as NRC-ED-4.
- TSB-7, Rev. 0 has been incorporated with related material in TSTF-338.
- TSB-12, Rev. 0 is incorporated by TSTF-263.
- TSB-15, Rev 0 has been incorporated in TSTF-340.
- TSB-16, Rev. 0 has been rejected by WOG. Due to multiple designs, this is not a generic change. This issue should be addressed as necessary on a plant specific basis.
- TSB-17, Rev. 0 is still under evaluation. WOG is providing a draft resolution of the pressurizer level position for review by BWOG and CEOG. The steam generator level portion requires evaluation which will likely extend beyond the deadline for inclusion into Revision 2 of the ITS NUREGs.
- TSB-18, Rev. 0 is under evaluation which will likely extend beyond the deadline for inclusion into Revision 2 of the ITS NUREGs.
- TSB-19, Rev. 0 is similar to TSTF-164. The TSTF recommends approval of TSTF-164 rather than processing TSB-19.
- TSB-20, Rev. 0 is under evaluation by WOG.
- TSB-21, Rev 0 concerning Reactor Coolant System Specific Activity LCO 3.4.16 is still under evaluation by the TSTF. Additional dialogue is required between the TSTF and NRC.

The TSTF also withdraws TSTFs-270 and 288 and they have been addressed in TSTF-284, Rev. 2. Also, as explained in our meeting June 16, 1999, the TSTF requests you reconsider your rejection of TSTF-41.

An updated priority list is also enclosed.

Please contact me at (202) 739-8105 or Vince Gilbert at (202) 739-8138 if you have any questions or need to meet with industry experts on these recommended changes.

Sincerely,

James W. Davis

Enclosures

c: Deborah L. Johnson
Stewart L. Magruder NRR-DRPM
Technical Specification Task Force

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.

Industry Contact: Buschbaum, Denny (254) 897-5851 dbuschb1@tuelectric.com

NRC Contact: Giardina, Bob 301-314-3152 lbb1@nrc.gov

Revision History

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

Revision Proposed by: Sequoyah

6/15/99

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

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 11-Jun-99

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 11-Jun-99

TSTF Review Information

TSTF Received Date: 11-Jun-99 Date Distributed for Review 11-Jun-99

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 15-Jun-99

NRC Review Information

NRC Received Date: 16-Jun-99

NRC Comments:
(No Comments)

Final Resolution: NRC Action Pending Final Resolution Date:

Incorporation Into the NUREGs

File to BBS/LAN Date: TSTF Informed Date: TSTF Approved Date:

NUREG Rev Incorporated:

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)

TSTF-335

Attachment 1
Technical Specification 3.6.15
No Significant Hazards Consideration

TSTF-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.

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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. <u>The proposed amendment does not involve a significant reduction in a margin of safety.</u>

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.

TSTF-315

Insert A

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.15.2	Verify total weight of stored ice 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. DELETE	9 months [18] at the beginning of each operating cycle
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

(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

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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)

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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-335

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

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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.

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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)

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)

TSTF-335

Attachment 4
NUREG 1432,
Technical Specification 3.6.15
Information Only Pages

TSTF-335

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)

Industry/TSTF Standard Technical Specification Change Traveler

Ice bed flow channel blockage surveillance requirement

Classification: 3) Improve Specifications

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

Description:

The proposed change would revise the Ice Bed Technical Specifications (TS) and associated TS Bases in surveillance requirement (SR) 3.6.15.4.

The proposed change replaces the current visual inspection requirement that uses a 0.38 inch ice/frost buildup criteria. The proposed change is a visual surveillance program that provides at least 95 percent confidence level that flow blockage does not exceed the 15 percent blockage of the total flow area assumed in the accident analyses. Whereas, the 0.38 inch program required inspection of as few as two flow channels per ice condenser bay, the new program will require at least 54 (33 percent) of the 162 flow channels per bay to be inspected.

The proposed change revises SR 3.6.15.4 frequency interval from 9 months to 18 months for flow passage inspection of the ice condenser. The surveillance is intended to be performed following outage maintenance as an as left surveillance.

This change also proposes to revise the applicability from "flow channels through the ice condenser" to "flow channels through the ice bed". A proposed revision to the TS Bases clarifies which structures are to be inspected. The revision limits the structures to be inspected to only include "between ice baskets" and "past lattice frames and wall panels". The TS Bases revision also is expanded to explain why other structures within the ice condenser are not inspected per the SR.

The proposal deletes the word "frost" from the SR. The Westinghouse bases for frost and ice as it applies to the SR have been added to the TS Bases to explain why frost is not an impediment to air/steam flow through the ice condenser.

Justification:

Recent industry events prompted the WOG Ice Condenser Mini-Group (ICMG) to review ice condenser technical specifications to identify enhancements that would provide direct correlation to design bases accident (DBA) analyses. DBA analyses demonstrate that design limits for pressurization of lower containment subcompartments and the steel containment vessel will not be exceeded with 15 percent blockage of the ice bed flow channels. Review of SR 3.6.15.4 determined that the 0.38 inch ice/frost buildup criteria does not adequately provide for the full intent of the surveillance. Through discussions with Westinghouse, the ICMG has determined that there is no direct correlation between the existing standard TS 0.38 inch criteria for ice/frost accumulation on flow area structural members and the percentage of overall flow blockage assumed in the plant analyses. However, the proposed change provides an acceptance criteria of <= 15 percent blockage, which is directly related to this functional requirement.

Frost, as recognized by Westinghouse, is not an impediment to steam and air flow. The Westinghouse definitions for frost and ice have been added to the Bases of SR 3.6.15.4, and frost specifically excluded as flow channel blockage to preclude potential declarations of inoperability due to frost rather than ice.

Ice Condenser operability is assured by numerous means during operations. The ice bed temperature is monitored at least once every twelve hours to ensure temperatures are less than or equal to 27 F. This is accomplished in a conservative manner by reviewing numerous points throughout the ice condenser to ensure all points are less than or equal to 27 F. In addition to the surveillance requirements, there are alarms in the control room that will indicate to the operator if any of the points being recorded reach 27 F. Also, weekly operator tours require the operators to walkdown the refrigeration system to evaluate its ability to function. This includes walking down the chillers, air handling units, and glycol pumps to ensure that they are in proper working order. The tours also require the operators to inspect the intermediate deck doors to ensure they are not frozen shut. This helps to ensure that no abnormal degradation of the ice condenser is occurring due to condensation or frozen drain lines in localized areas.

Ice Condenser operability is demonstrated by the performance of various procedures. Procedures verify the ice bed is in

good physical condition. Procedures also validate assumptions used in the accident analysis. The flow passage inspection is performed to ensure the absence of abnormal ice bed degradation as would be indicated if accumulations exceed the SR acceptance criteria.

The request to increase the surveillance interval from nine months to eighteen months would require the performance of such ice bed monitoring during refueling outages. ICMG members believe that industry improvements in ice bed inspection results, due to modified maintenance techniques that have been implemented, provide adequate assurance that the ice condenser can meet and even exceed its design function without performing the surveillance on a nine month frequency.

Examples of Operating Experience and Industry concerted improvements:
> Improved control of doors during maintenance including appropriate penetrations for hoses to minimize ice condenser heat and humidity gains.
>Improved management of wall and floor defrost cycles (if used, occurs only during outages).
>Improved preventative maintenance programs on Ice Condenser cooling systems.
> Increased priority on repair of Ice Condenser cooling systems.
> Improved training and procedures for emptying and refilling of baskets, and subsequent clean up.
> Improved training and procedures for flow passage surveillances.
> Proposed increase in minimum sample size requirement for flow passage surveillance.
> Proposed surveillance acceptance criterion that effectively aligns with DBA analysis for operability determination.

Improved control of maintenance has limited those activities with the potential for significant flow channel blockage to during refueling outages. Verifying an ice bed is left with less than or equal to 15 % flow channel blockage at the conclusion of a refueling outage assures the ice bed will remain in an acceptable condition for the duration of the operating cycle. During the operating cycle, an expected amount of ice sublimates and reforms as frost on the colder surfaces in the Ice Condenser. However, frost does not degrade flow channel flow area. Therefore, flow channel blockage surveillance should only be required at the conclusion of scheduled refueling outages. The surveillance will effectively demonstrate operability for an allowed 18 month surveillance period.

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Revision History

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

Revision Proposed by: McGuire

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 11-Jun-99

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 11-Jun-99

TSTF Review Information

TSTF Received Date: 11-Jun-99 Date Distributed for Review 11-Jun-99

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 15-Jun-99

NRC Review Information

NRC Received Date: 16-Jun-99

NRC Comments:

(No Comments)

Final Resolution: NRC Action Pending Final Resolution Date:

Incorporation Into the NUREGs

File to BBS/LAN Date: TSTF Informed Date: TSTF Approved Date:

NUREG Rev Incorporated:

Affected Technical Specifications

SR 3.6.15.4	Ice Bed (Ice Condenser)
SR 3.6.15.4 Bases	Ice Bed (Ice Condenser)
Bkgnd 3.6.15 Bases	Ice Bed (Ice Condenser)

TSTF-336

Attachment 1
Technical Specification 3.6.15
No Significant Hazards Consideration

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.

Neither the TS amendment nor the TS Bases change can increase the probability of occurrence of any analyzed accident because they are not the result or cause of any physical modification to ice condenser structures. For the current design of the ice condenser, there is no correlation between any credible failure of it and the initiation of any previously analyzed event.

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

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 elimination

of the mid-cycle surveillance does not significantly increase the consequence of an accident previously evaluated. Improved control of maintenance has limited those activities with the potential for significant flow channel blockage to during refueling outages. Verifying an ice bed is left with less than or equal to 15 % flow channel blockage at the conclusion of a refueling outage assures the ice bed will remain in an acceptable condition for the duration of the operating cycle. During the operating cycle, a certain amount of ice sublimates and reforms as frost on the colder surfaces in the Ice Condenser. However, frost does not degrade flow channel flow area. The surveillance will effectively demonstrate operability for an allowed 18 month surveillance period. Therefore, increasing the surveillance frequency does not affect the Ice Condenser operation or accident response. Limiting ice bed flow channel blockage to less than or equal to 15 % ensures operation is consistent with the assumptions of the design basis accident (DBA) analyses. Therefore, 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.**

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

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

Design Basis Accident analyses have shown that with 85 percent of the total flow area available (uniformly distributed), the ice condenser will perform its intended function. Thus, the safety limit for ice condenser operability is a maximum 15 percent blockage of flow channels. SR 3.6.15.4 currently uses a specific value of 0.38 inch buildup to determine if unacceptable frost/ice blockage exists in the ice condenser. However, this specific value does not have a direct correlation to the safety limit for blockage of ice condenser flow area. The proposed TS amendment requires more extensive visual inspection (33 percent of the flow area/bay) than is currently described (2 flow channels/bay) in the TS Bases for SR 3.6.15.4, thus providing greater reliability and a

direct relationship to the analytical safety limits. Changing the TS to implement a surveillance program that is more reliable and uses acceptance criteria of less than or equal to 15 percent flow blockage, as allowed by the TMD analysis, will not reduce the margin of safety of any TS.

The proposed amendment also revises the surveillance frequency from every 9 months to every 18 months such that it will coincide with refueling outages. Verifying an ice bed is left with less than or equal to 15 % flow channel blockage at the conclusion of a refueling outage assures the ice bed will remain in an acceptable condition for the duration of the operating cycle. During the operating cycle, a certain amount of ice sublimates and reforms as frost on the colder surfaces in the Ice Condenser. However, frost has been determined to not degrade flow channel flow area. Thus, design limits for the continued safe function of containment sub-compartment walls and the steel containment vessel are not exceeded due to this change.

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.

TSTF-336

Attachment 2
NUREG 1431, Revision 1
Technical Specification 3.6.15
Marked Up Pages

TSTF-336

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.15.2	Verify total weight of stored ice 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
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 tne sample baskets in each group from radial rows 1, 2, 4, 6, 8, and 9 shall be ≥ [1400] lb.	9 months
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.~~ bed is ≤ 15 percent blockage of the total flow area.	~~9~~ 18 months

(continued)

Insert A

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.

Insert B

This SR ensures that the 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 sub-compartment response to a design basis LOCA with partial blockage of the ice condenser flow channels. The analysis did not perform detailed flow area modeling, but 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 ice bed flow passage 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 support structures and turning vanes, a gross buildup of ice on these structures would be required to degrade air and steam flow. Therefore, these structures are excluded as part of a flow channel for application of the 15 percent blockage criteria. Industry experience has shown that removal of ice from the excluded structures during the refueling outage is sufficient to ensure they remain operable throughout the operating cycle. 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 no 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.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.15 Ice Bed (Ice Condenser)

ADD

1944

BASES

BACKGROUND

The ice bed consists of over [2,721,600] lb of ice stored in baskets within the ice condenser. Its primary purpose is to provide a large heat sink in the event of a release of energy from a 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 unit 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 unit 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 unit operation. The upper plenum area is used to facilitate surveillance and maintenance of the ice bed.

Insert A

~~The ice baskets held in the ice bed within the ice condenser are arranged 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 the upper compartment. Steam condensation within the ice condenser limits the pressure and temperature buildup in

(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.

SR 3.6.15.4

Insert B

~~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)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.15.4 (continued)

~~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.~~

SR 3.6.15.5

Verifying the chemical composition of the stored ice ensures that the stored ice has a boron concentration of at least [1800] 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. 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 [18] months was developed considering these facts

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

b. Operating experience has demonstrated that meeting the boron concentration and pH requirements has never been a problem; and

c. Someone would have to enter the containment to take the sample, and, if the unit is at power, that person would receive a radiation dose.

SR 3.6.15.6

This SR ensures that a representative sampling of ice baskets, which are relatively thin walled, perforated cylinders, have not been degraded by wear, cracks, corrosion, or other damage. Each ice basket must be raised at least 12 feet for this inspection. The Frequency of

(continued)

TSTF-336

Attachment 3
NUREG 1431, Revision 1
Technical Specification 3.6.15
Revised Pages

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.6.15.2	Verify total weight of stored ice 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
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
SR 3.6.15.4	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.	18 months

(continued)

B 3.6 CONTAINMENT SYSTEMS

B 3.6.15 Ice Bed (Ice Condenser)

BASES

BACKGROUND

The ice bed consists of over [2,721,600] 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 unit 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 unit 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 unit 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 the upper compartment. Steam condensation within the ice condenser limits the pressure and temperature buildup in

(continued)

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BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.15.4 (continued)

throughout the operating cycle. 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 no 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.

SR 3.6.15.5

Verifying the chemical composition of the stored ice ensures that the stored ice has a boron concentration of at least [1800] 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. 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

(continued)

Tennessee Valley Authority

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