Indiana Michigan
Power Company
500 Circle Drive
Buchanan, MI 49107 1395

INDIANA MICHIGAN POWER

September 3, 2003

AEP:NRC:3365
10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop O-P1-17
Washington, DC 20555-0001

SUBJECT: Donald C. Cook Nuclear Plant Unit 1 and Unit 2
Docket Nos. 50-315 and 50-316
License Amendment Request to Revise Limiting Condition for Operation for Weight of Ice in Ice Basket

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant Unit 1 and Unit 2, proposes to amend Appendix A, Technical Specifications (TS), of Facility Operating Licenses DPR-58 and DPR-74. I&M proposes to amend the TS Limiting Condition for Operation (LCO) that specifies the weight of ice in the ice condenser ice baskets, and the associated TS Bases, to be consistent with the associated Surveillance Requirement (SR).

The existing LCO requires that each ice basket contain at least 1144 pounds of ice. However, the SR allows the weight of ice in a sampled basket to be less than 1144 pounds if the average ice weight in an expanded sample of baskets is at least 1144 pounds at a 95 percent level of confidence. The LCO requirement does not recognize the allowance to satisfy the SR by performing additional sampling and averaging of the results. Consequently, if an ice basket is found to contain less than 1144 pounds of ice during the performance of the SR, the current wording of the LCO would invoke the associated TS Action. That TS Action requires that the ice bed be restored to an operable status within 48 hours or the unit must be shut down within the following 6 hours. Restoring the ice bed to an operable status by adding ice to an underweight basket with the unit operating is not practical.

I&M intends to begin performing the SR for Unit 1 on October 6, 2003. If an ice basket is found to contain less than 1144 pounds of ice during this SR performance, the current wording of the LCO would require shutdown of the unit prior to the scheduled start of the outage. Therefore, I&M requests approval

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of this amendment by October 6, 2003, to preclude the possibility of an unnecessary shutdown.

The proposed amendment is consistent with the latest revisions of the previous and current standard TS, NUREG-0452 and NUREG-1431 respectively. The proposed amendment has been reviewed for impact on plant operation and procedures. No pending amendment requests affect the TS pages that are submitted in this request. If any future submittals affect these TS pages, I&M will coordinate the changes to the pages with the Nuclear Regulatory Commission Project Manager to ensure proper TS page control when the associated license amendment requests are approved.

This letter contains no new commitments. Should you have any questions, please contact Mr. Brian A. McIntyre, Manager of Regulatory Affairs at (269) 697-5806.

Sincerely,

R. P. Powers
Executive Vice President

JW/rdw

Enclosures:
1. Affirmation
2. Application for Amendment to Revise Limiting Condition for Operation for Weight of Ice in Ice Basket

Attachments:
1a. Unit 1 Technical Specification Pages Marked to Show Proposed Changes
1b. Unit 2 Technical Specification Pages Marked to Show Proposed Changes
2a. Unit 1 Proposed Technical Specification Pages
2b. Unit 2 Proposed Technical Specification Pages

c: J. E. Dyer, NRC Region III
K. D. Curry, Ft. Wayne AEP, w/o enclosures/attachments
J. T. King, MPSC, w/o enclosures/attachments
MDEQ – WHMD/HWRPS, w/o enclosures/attachments
NRC Resident Inspector
M. A. Shuaibi, NRC Washington, DC

Enclosure 1 to AEP:NRC:3365

AFFIRMATION

I, Robert P. Powers, being duly sworn, state that I am Executive Vice President of American Electric Power Service Corporation and Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this request with the Nuclear Regulatory Commission on behalf of I&M, and that the statements made and the matters set forth herein pertaining to I&M are true and correct to the best of my knowledge, information, and belief.

American Electric Power Service Corporation

R. P. Powers
Executive Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 3rd DAY OF September 2003

Margaret M. Surenz
Notary Public

My Commission Expires 11-23-2005

Enclosure 2 to AEP:NRC:3365

Application for Amendment to Revise Limiting Condition for Operation for Weight of Ice in Ice Basket

The documents referenced below are identified at the end of this attachment.

1.0 DESCRIPTION

Pursuant to 10 CFR 50.90, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Unit 1 and Unit 2, proposes to amend Appendix A, Technical Specifications (TS), of Facility Operating Licenses DPR-58 and DPR-74. I&M proposes to amend the TS Limiting Condition for Operation (LCO) that specifies the weight of ice in the ice condenser ice baskets to be consistent with the associated Surveillance Requirement (SR). The existing LCO requires that each ice basket contain at least 1144 pounds of ice. However, the SR allows the weight of ice in a sampled basket to be less than 1144 pounds if the average ice weight in an expanded sample of baskets is at least 1144 pounds at a 95 percent level of confidence. I&M is also proposing changes to the TS Bases to recognize the changes to the LCO.

2.0 PROPOSED CHANGE

The Unit 1 and Unit 2 TS LCO that specifies the weight of ice in individual ice condenser ice baskets is TS 3.6.5.1.d. I&M proposes changing the phrase "Each ice basket" to "Ice baskets" in Unit 1 and Unit 2 TS 3.6.5.1.d. This change will allow the associated SR (TS 4.6.5.1.b.2) to define the detailed requirements for ice basket weight. I&M also proposes to change the associated Bases to recognize the allowance to satisfy the SR by performing additional sampling and averaging of the results.

These changes are shown in Attachments 1a, 1b, 2a, and 2b, to this letter.

3.0 BACKGROUND

The ice condenser is contained in the annulus formed by the containment wall and the crane wall. The ice condenser compartment extends approximately 300 degrees around the perimeter of the upper compartment of the containment, and penetrates the operating deck so that a portion extends into the containment lower compartment. The ice condenser annulus is divided radially into 24 bays. The ice in the bays is contained in an array of vertical cylindrical columns 48 feet high, and 12 inches in diameter. The columns are formed by perforated sheet metal baskets, and the spaces between the columns form flow channels for steam and air.

In the event of a loss-of-coolant accident or steam line break in the containment, the pressure rise in the lower compartment would open door panels located below the operating deck. This would allow air and steam to flow from the lower compartment into the ice condenser. The resulting pressure increase within the ice condenser would cause intermediate deck doors and door panels at the top of the ice condenser to open, allowing the flow out of the ice condenser into the upper compartment. Steam entering the ice condenser compartment would be condensed by the ice, thus limiting the peak pressure and temperature buildup in the containment. Additional information regarding the ice condenser is available in section 5.3 of the CNP Updated Final Safety Analysis Report (UFSAR).

TS 3/4.6.5.1 contains LCOs and SRs for several ice condenser ice bed parameters. TS 3.6.5.1.d is the LCO for the weight of ice in the individual ice condenser ice baskets. This LCO requires that each ice basket contain at least 1144 pounds of ice at the end of the unit's fuel cycle. With two exceptions, this LCO requirement has existed in the CNP TS since their initial approval, and is consistent with Revisions 0 and 1 of the previous standard Westinghouse TS, NUREG-0452. The two exceptions consist of changes in the numerical value of the pounds of ice required and the addition, by Reference 1, of a condition that the weight of ice be determined at the end of the operating cycle. In Revisions 2, 3, 4, and 5 of NUREG-0452, the LCO for weight of ice in individual baskets was replaced with an LCO for the total ice weight.

TS 4.6.5.1.b.2 is the SR that verifies the requirements of TS 3.6.5.1.d have been met. This SR requires that, at least once per 18 months (at the end of the unit's fuel cycle), a representative sample of at least 144 ice baskets be weighed to verify that each ice basket contains at least 1144 pounds of ice. If a basket is found to contain less than 1144 pounds of ice, the SR may be satisfied if a representative sample of 20 additional baskets from the same bay is weighed, and the average ice weight in the 20 additional baskets and the discrepant basket is at least 1144 pounds at a 95 percent level of confidence. The SR also requires verification that the total weight of ice in the ice condenser is greater than a specified value. The allowance to satisfy the SR by performing additional sampling and averaging of the results has existed in the CNP TS since their initial approval, and is consistent with all revisions of NUREG-0452.

As currently worded, the LCO requirement does not recognize the allowance to satisfy the SR by performing additional sampling and averaging of the results. Consequently, if an ice basket is found to contain less than 1144 pounds of ice during the performance of the SR, the current wording of the LCO invokes the associated TS Action. That TS Action requires that the ice bed be restored to an operable status within 48 hours, or the unit must be placed in hot standby within the following 6 hours, and in cold shutdown within the following 30 hours. Restoring the ice bed to an operable status by adding ice to an underweight basket with the unit operating is not practical. Under-weight ice baskets are typically the result of sublimation occurring over the course of the operating cycle. The majority of sublimation occurs at the bottom of the basket which is located in the lower ice condenser. This area is typically a high radiation area during full power operations and it is not practical to add ice to the bottom of the baskets. Therefore a plant shutdown would be required. I&M normally performs the SR approximately 2 weeks prior to the start of a unit's refueling outage. If an ice basket is found to contain less than 1144 pounds of ice during this SR performance, the current wording of the LCO would require shutdown of the unit prior to the scheduled start of the outage. To preclude the possibility of such an unscheduled shutdown, I&M is proposing to revise the LCO to allow the associated SR to define the detailed requirements for ice basket weight.

4.0 TECHNICAL ANALYSIS

As described below, the proposed change will not affect the ability of the ice condenser to perform its intended safety function.

The requirement to verify that individual baskets contain a specified weight of ice provides assurance that there is no localized zone in the ice condenser that is grossly deficient in ice. Such a zone could experience early melt-out during an accident, creating a path for steam to pass through the ice bed without being condensed. The provision in the SR to weigh 20 additional baskets from the same bay ensures that discovery of an individual basket containing less than 1144 pounds of ice is not indicative of such a localized gross ice deficiency. As noted above, this provision has been included in the CNP TS since their initial approval, and is included in all revisions of the previous standard TS, NUREG-0452. The provision is also included in the TS for all other ice condenser plants.

The current values for individual basket ice weight and total ice weight were approved by the NRC in Unit 1 Amendment 234 and Unit 2 Amendment 217 (Reference 1). These amendments were based on analyses (described in Reference 2) that address the accident parameters affected by the ice condenser, such as short and long term containment pressure, recirculation sump inventory, and recirculation boron concentration. These analyses assume a certain total mass of ice in the ice condenser and no bypassing of ice within the ice condenser. The allowance to satisfy the LCO by performing additional sampling and averaging of the results does not affect these assumptions. Therefore, the analyses remain valid.

5.0 REGULATORY SAFETY ANALYSIS

No Significant Hazards Consideration

I&M has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or the consequences of an accident previously evaluated?

   Response: No.

   I&M proposes to amend the CNP TS to remove an inconsistency between the LCO that specifies the weight of ice in the ice condenser ice baskets and the associated SR. The existing LCO requires that each ice basket contain a specified minimum weight of ice.

However, the SR allows the weight of ice in a sampled basket to be less than that specified in the LCO if the average ice weight in an expanded sample of baskets is at least that specified in the LCO. The proposed change consists of a wording change in the LCO to permit utilization of this existing allowance in the SR. There are no credible accidents initiated by the ice condenser. The relevant accident analyses assume a certain total mass of ice within the ice condenser and no bypassing of ice in the ice condenser. The proposed change does not affect these assumptions. Therefore, neither the probability of an accident nor the consequences of an accident will be significantly increased.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed change allows utilization of an existing allowance in the SR for the weight of ice in the ice condenser ice baskets. There are no credible accidents initiated by the ice condenser. The proposed change does not affect the design function of any component, or change any parameter that can initiate an accident. Therefore, no new accident initiators or precursors will be introduced, and the possibility of a new or different kind of accident will not be created.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The proposed change does not affect the margins associated with ice condenser ice mass assumed in the accident analyses. These analyses assume a certain total mass of ice in the ice condenser and no bypassing of ice within the ice condenser. The allowance to satisfy the SR by performing additional sampling and averaging of the results does not affect these assumptions. Therefore, there is no significant reduction in a margin of safety.

Applicable Regulatory Requirements/Criteria

Section 5.3 of the CNP UFSAR provides a description of the ice condenser and its design criteria. This UFSAR section is not affected by the proposed amendment.

Reference 2 provides a description of the accident analyses that are the basis for the requirements for the weight of ice in the ice baskets and total weight of ice specified in the LCO and SR. These analyses are not affected by this proposed amendment.

NUREG-1431 provides the current standard TS for Westinghouse plants. Similar to NUREG-1431, the proposed change will allow the SR to define the detailed requirements for ice basket weight. The descriptive text proposed for addition to the TS Bases is similar to that contained in the NUREG-1431 Bases.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or SR. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. Letter from J. F. Stang, NRC, to R. P. Powers, I&M, "Issuance of Amendments – Donald C. Cook Nuclear Plant, Units 1 and 2 (TAC Nos. MA6766 and MA6767)," dated December 13, 1999.

2. Letter from R. P. Powers, I&M, to the Nuclear Regulatory Commission Document Control Desk, "Donald C. Cook Nuclear Plant Units 1 and 2, Technical Specification Change Request Containment Recirculation Sump Water Inventory," submittal C1099-08, dated October 1, 1999.

Attachment 1a to AEP:NRC:3365

UNIT 1
TECHNICAL SPECIFICATIONS PAGES
MARKED TO SHOW PROPOSED CHANGES

REVISED PAGES

3/4 6-26
B 3/4 6-4

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 boron concentration of at least 1800 ppm (the boron being in the form of sodium tetraborate), and a pH of 9.0 to 9.5 at 25°C,

b. Flow channels through the ice condenser,

c. A maximum ice bed temperature of ≤ 27°F,

d. ~~Each i~~Ice baskets containing at least 1144 lbs of ice (end-of-cycle), and

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 ≤ 27°F.

b. At least once per 18 months by:

1. Chemical analyses which verify that at least 9 representative samples of stored ice have a boron concentration of at least 1800 ppm (the boron being in the form of sodium tetraborate), and a pH of 9.0 to 9.5 at 25°C.

2. Weighing a representative sample of at least 144 ice baskets and verifying that each ice basket contains at least 1144 lbs of ice (end-of-cycle). The representative sample shall include 6 baskets from each of the 24 ice condenser bays and

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, 3) contain sufficient heat removal capability to condense the reactor system volume released during a LOCA, 4) contain sufficient water to maintain adequate sump inventory, and 5) result in a post-LOCA sump pH within the allowed range. These conditions are consistent with the assumptions used in the accident analyses.

The ice, together with the containment spray, is adequate to absorb the initial blowdown of steam and water from a design basis accident and the additional heat loads that would enter containment during several hours following the initial blowdown. The additional heat loads would come from the residual heat in the reactor core, the hot piping and components, and the secondary system, including the steam generators.

Over the course of a fuel cycle, sublimation reduces the weight of ice in the ice condenser. For the ice condenser to be considered OPERABLE, the minimum as-found ice weight of 1144 pounds per ice basket, for those ice baskets selected for weighing per the surveillance requirements, must be present at the end of a fuel cycle. In accordance with the surveillance requirements, if a basket is found to contain less than 1144 pounds 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 greater than or equal to 1144 pounds at a 95 percent level of confidence. Weighing 20 additional baskets from the same bay in the event a surveillance reveals that a basket contains less that 1144 pounds of ice ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a design basis accident, creating a path for steam to pass through the ice bed without being condensed. An instrument measurement error allowance is included in the required minimum ice basket weight. To account for loss due to sublimation, a conservative average ice bed sublimation of 10% over an eighteen-month period is used. The beginning-of-cycle, or as-left ice basket weight, is adjusted accordingly to assure the LCO limit will be met at the end of each fuel cycle.

The containment subcompartment analysis assumes a uniform 15% blockage of the ice condenser flow channels, utilizing the most restrictive area within the 48 foot height of the ice bed, which are the lattice frame elevations. The analysis conservatively assumes that the restricted area at the lattice frames, further reduced by 15%, exists over the entire 48 foot height of the ice bed. The containment subcompartment analysis lumps the 24 ice condenser bays into six groups for analysis purposes. The 3/8" criterion for frost or ice accumulation in a flow channel provides an indicator of the ice condenser condition. The lattice frame thickness is 3/8" and, therefore, this dimension provides a convenient visual comparison reference during flow passage inspections. More than one restricted flow passage per bay is evidence of abnormal degradation of the ice condenser and would require additional flow passage inspection and engineering assessment to ensure that the 15% blockage assumed in containment subcompartment analysis is met.

3/4.6.5.2 ICE BED TEMPERATURE MONITORING SYSTEM

The OPERABILITY of the ice bed temperature monitoring system ensures that the capability is available for monitoring the ice temperature. In the vent the monitoring system is inoperable, the ACTION requirements provide assurance that the ice bed heat removal capacity will be retained within the specified time limits.

Attachment 1b to AEP:NRC:3365

UNIT 2
TECHNICAL SPECIFICATIONS PAGES
MARKED TO SHOW PROPOSED CHANGES

REVISED PAGES

3/4 6-35
B 3/4 6-4a

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 boron concentration of at least 1800 ppm (the boron being in the form of sodium tetraborate), and a pH of 9.0 to 9.5 at 25°C,

b. Flow channels through the ice condenser,

c. A maximum ice bed temperature of ≤ 27°F,

d. ~~Each i~~[redacted]ce basket[redacted] containing at least 1144 lbs of ice (end-of-cycle), and

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 ≤ 27°F.

b. At least once per 18 months by:

1. Chemical analyses which verify that at least 9 representative samples of stored ice have a boron concentration of at least 1800 ppm (the boron being in the form of sodium tetraborate), and a pH of 9.0 to 9.5 at 25°C.

2. Weighing a representative sample of at least 144 ice baskets and verifying that each ice basket contains at least 1144 lbs of ice (end-of-cycle). The representative sample shall include 6 baskets from each of the 24 ice condenser bays and

3/4.6.4 COMBUSTIBLE GAS CONTROL (continued)

Confidence in system OPERABILITY is demonstrated by surveillance testing. Since many igniters are inaccessible at power, surveillance testing in MODE 1 is limited to measurement of igniter current when the DIS is energized by groups. Measured currents are compared with baseline data for the group.

Igniter temperature measurement for all igniters can only be performed during shutdown and is performed every 18 months. This testing energizes all igniters and confirms the ability of each igniter to obtain a surface temperature of at least 1700°F. This temperature is conservatively above the temperature necessary to ignite hydrogen mixtures at concentrations near the lower flammability limit. Test experience indicates that individual igniter failures are generally total failures and do not involve the inability to reach the required temperature when an igniter is drawing normal amperage. This observed failure mode provides reasonable confidence that an igniter failing to reach the required temperature would also be detected by reduced group current measurements during the MODE 1 surveillances. Therefore the 18 month frequency for actual temperature measurements is acceptable.

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, 3) contain sufficient heat removal capability to condense the reactor system volume released during a LOCA, 4) contain sufficient water to maintain adequate sump inventory, and 5) result in a post-LOCA sump pH within the allowed range. These conditions are consistent with the assumptions used in the accident analyses.

The ice, together with the containment spray, is adequate to absorb the initial blowdown of steam and water from a design basis accident and the additional heat loads that would enter containment during several hours following the initial blowdown. The additional heat loads would come from the residual heat in the reactor core, the hot piping and components, and the secondary system, including the steam generators.

Over the course of a fuel cycle, sublimation reduces the weight of ice in the ice condenser. For the ice condenser to be considered OPERABLE, the minimum as-found ice weight of 1144 pounds per ice basket, for those ice baskets selected for weighing per the surveillance requirements, must be present at the end of a fuel cycle. In accordance with the surveillance requirements, if a basket is found to contain less than 1144 pounds 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 greater than or equal to 1144 pounds at a 95 percent level of confidence. Weighing 20 additional baskets from the same bay in the event a surveillance reveals that a basket contains less than 1144 pounds of ice ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a design basis accident, creating a path for steam to pass through the ice bed without being condensed. An instrument measurement error allowance is included in the required minimum ice basket weight. To account for loss due to sublimation, a conservative average ice bed sublimation of 10% over an eighteen-month period is used. The beginning-of-cycle, or as-left ice basket weight, is adjusted accordingly to assure the LCO limit will be met at the end of each fuel cycle.

The containment subcompartment analysis assumes a uniform 15% blockage of the ice condenser flow channels, utilizing the most restrictive area within the 48 foot height of the ice bed, which are the lattice frame elevations. The analysis conservatively assumes that the restricted area at the lattice frames, further reduced by 15%, exists over the entire 48 foot height of the ice bed. The containment subcompartment analysis lumps the 24 ice condenser bays into six groups for analysis purposes. The 3/8" criterion for frost or ice accumulation in a flow channel provides an

Attachment 2a to AEP:NRC:3365

UNIT 1
PROPOSED TECHNICAL SPECIFICATIONS PAGES

REVISED PAGES

3/4 6-26
B 3/4 6-4

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 boron concentration of at least 1800 ppm (the boron being in the form of sodium tetraborate), and a pH of 9.0 to 9.5 at 25°C,

b. Flow channels through the ice condenser,

c. A maximum ice bed temperature of ≤ 27°F,

d. Ice baskets containing at least 1144 lbs of ice (end-of-cycle), and

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 ≤ 27°F.

b. At least once per 18 months by:

1. Chemical analyses which verify that at least 9 representative samples of stored ice have a boron concentration of at least 1800 ppm (the boron being in the form of sodium tetraborate), and a pH of 9.0 to 9.5 at 25°C.

2. Weighing a representative sample of at least 144 ice baskets and verifying that each ice basket contains at least 1144 lbs of ice (end-of-cycle). The representative sample shall include 6 baskets from each of the 24 ice condenser bays and

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, 3) contain sufficient heat removal capability to condense the reactor system volume released during a LOCA, 4) contain sufficient water to maintain adequate sump inventory, and 5) result in a post-LOCA sump pH within the allowed range. These conditions are consistent with the assumptions used in the accident analyses.

The ice, together with the containment spray, is adequate to absorb the initial blowdown of steam and water from a design basis accident and the additional heat loads that would enter containment during several hours following the initial blowdown. The additional heat loads would come from the residual heat in the reactor core, the hot piping and components, and the secondary system, including the steam generators.

Over the course of a fuel cycle, sublimation reduces the weight of ice in the ice condenser. For the ice condenser to be considered OPERABLE, the minimum as-found ice weight of 1144 pounds per ice basket, for those ice baskets selected for weighing per the surveillance requirements, must be present at the end of a fuel cycle. In accordance with the surveillance requirements, if a basket is found to contain less than 1144 pounds 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 greater than or equal to 1144 pounds at a 95 percent level of confidence. Weighing 20 additional baskets from the same bay in the event a surveillance reveals that a basket contains less that 1144 pounds of ice ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a design basis accident, creating a path for steam to pass through the ice bed without being condensed. An instrument measurement error allowance is included in the required minimum ice basket weight. To account for loss due to sublimation, a conservative average ice bed sublimation of 10% over an eighteen-month period is used. The beginning-of-cycle, or as-left ice basket weight, is adjusted accordingly to assure the LCO limit will be met at the end of each fuel cycle.

The containment subcompartment analysis assumes a uniform 15% blockage of the ice condenser flow channels, utilizing the most restrictive area within the 48 foot height of the ice bed, which are the lattice frame elevations. The analysis conservatively assumes that the restricted area at the lattice frames, further reduced by 15%, exists over the entire 48 foot height of the ice bed. The containment subcompartment analysis lumps the 24 ice condenser bays into six groups for analysis purposes. The 3/8" criterion for frost or ice accumulation in a flow channel provides an indicator of the ice condenser condition. The lattice frame thickness is 3/8" and, therefore, this dimension provides a convenient visual comparison reference during flow passage inspections. More than one restricted flow passage per bay is evidence of abnormal degradation of the ice condenser and would require additional flow passage inspection and engineering assessment to ensure that the 15% blockage assumed in containment subcompartment analysis is met.

3/4.6.5.2 ICE BED TEMPERATURE MONITORING SYSTEM

The OPERABILITY of the ice bed temperature monitoring system ensures that the capability is available for monitoring the ice temperature. In the vent the monitoring system is inoperable, the ACTION requirements provide assurance that the ice bed heat removal capacity will be retained within the specified time limits.

Attachment 2b to AEP:NRC:3365

UNIT 2
PROPOSED TECHNICAL SPECIFICATIONS PAGES

REVISED PAGES

3/4 6-35
B 3/4 6-4a
B 3/4 6-4b

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 boron concentration of at least 1800 ppm (the boron being in the form of sodium tetraborate), and a pH of 9.0 to 9.5 at 25°C,

b. Flow channels through the ice condenser,

c. A maximum ice bed temperature of ≤ 27°F,

d. Ice baskets containing at least 1144 lbs of ice (end-of-cycle), and

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 ≤ 27°F.

b. At least once per 18 months by:

1. Chemical analyses which verify that at least 9 representative samples of stored ice have a boron concentration of at least 1800 ppm (the boron being in the form of sodium tetraborate), and a pH of 9.0 to 9.5 at 25°C.

2. Weighing a representative sample of at least 144 ice baskets and verifying that each ice basket contains at least 1144 lbs of ice (end-of-cycle). The representative sample shall include 6 baskets from each of the 24 ice condenser bays and

3/4.6.4 COMBUSTIBLE GAS CONTROL (continued)

Confidence in system OPERABILITY is demonstrated by surveillance testing. Since many igniters are inaccessible at power, surveillance testing in MODE 1 is limited to measurement of igniter current when the DIS is energized by groups. Measured currents are compared with baseline data for the group.

Igniter temperature measurement for all igniters can only be performed during shutdown and is performed every 18 months. This testing energizes all igniters and confirms the ability of each igniter to obtain a surface temperature of at least 1700°F. This temperature is conservatively above the temperature necessary to ignite hydrogen mixtures at concentrations near the lower flammability limit. Test experience indicates that individual igniter failures are generally total failures and do not involve the inability to reach the required temperature when an igniter is drawing normal amperage. This observed failure mode provides reasonable confidence that an igniter failing to reach the required temperature would also be detected by reduced group current measurements during the MODE 1 surveillances. Therefore the 18 month frequency for actual temperature measurements is acceptable.

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, 3) contain sufficient heat removal capability to condense the reactor system volume released during a LOCA, 4) contain sufficient water to maintain adequate sump inventory, and 5) result in a post-LOCA sump pH within the allowed range. These conditions are consistent with the assumptions used in the accident analyses.

The ice, together with the containment spray, is adequate to absorb the initial blowdown of steam and water from a design basis accident and the additional heat loads that would enter containment during several hours following the initial blowdown. The additional heat loads would come from the residual heat in the reactor core, the hot piping and components, and the secondary system, including the steam generators.

Over the course of a fuel cycle, sublimation reduces the weight of ice in the ice condenser. For the ice condenser to be considered OPERABLE, the minimum as-found ice weight of 1144 pounds per ice basket, for those ice baskets selected for weighing per the surveillance requirements, must be present at the end of a fuel cycle. In accordance with the surveillance requirements, if a basket is found to contain less than 1144 pounds 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 greater than or equal to 1144 pounds at a 95 percent level of confidence. Weighing 20 additional baskets from the same bay in the event a surveillance reveals that a basket contains less than 1144 pounds of ice ensures that no local zone exists that is grossly deficient in ice. Such a zone could experience early melt out during a design basis accident, creating a path for steam to pass through the ice bed without being condensed. An instrument measurement error allowance is included in the required minimum ice basket weight. To account for loss due to sublimation, a conservative average ice bed sublimation of 10% over an eighteen-month period is used. The beginning-of-cycle, or as-left ice basket weight, is adjusted accordingly to assure the LCO limit will be met at the end of each fuel cycle.

The containment subcompartment analysis assumes a uniform 15% blockage of the ice condenser flow channels, utilizing the most restrictive area within the 48 foot height of the ice bed, which are the lattice frame elevations. The analysis conservatively assumes that the restricted area at the lattice frames, further reduced by 15%, exists over the entire 48 foot height of the ice bed. The containment subcompartment analysis lumps the 24 ice condenser bays into six groups for analysis purposes. The 3/8" criterion for frost or ice accumulation in a flow channel provides an indicator of the ice condenser condition. The lattice frame thickness is 3/8" and, therefore, this dimension provides a convenient visual comparison reference during flow passage inspections. More than one restricted flow passage per bay is evidence of abnormal degradation of the ice condenser and would require additional flow passage inspection and engineering assessment to ensure that the 15% blockage assumed in containment subcompartment analysis is met.

3/4.6.5.2 ICE BED TEMPERATURE MONITORING SYSTEM

The OPERABILITY of the ice bed temperature monitoring system ensures that the capability is available for monitoring the ice temperature. In the event the monitoring system is inoperable, the ACTION requirements provide assurance that the ice bed heat removal capacity will be retained within the specified time limits.