Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

July 14, 2005

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No.	05-307
MPS Lic/MAE	R0
Docket No.	50-336
License No.	DPR-65

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 2
PROPOSED REVISION TO TECHNICAL SPECIFICATIONS (LBDCR 05-MP2-003)
REACTOR COOLANT SYSTEM HEATUP/COOLDOWN LIMITS

Pursuant to 10 CFR 50.90, Dominion Nuclear Connecticut, Inc. (DNC) hereby requests to amend Operating License DPR-65 for Millstone Power Station Unit 2 (MPS2). The enclosed license amendment request proposes to revise Technical Specification 3.4.9.1, "Reactor Coolant System." The proposed changes will modify the reactor coolant system (RCS) heatup and cooldown limits. The associated technical specification bases will be updated to address the proposed changes.

The proposed amendment does not involve a significant impact on public health and safety and does not involve a significant hazards consideration pursuant to the provisions of 10 CFR 50.92.

The Site Operations Review Committee and the Management Safety Review Committee have reviewed and concurred with the determinations.

Attachment 1 contains a description of the proposed technical specification (TS) change and the significant hazards consideration. Attachment 2 contains the TS marked-up pages and Attachment 3 contains the retyped pages. Attachment 4 contains the marked-up pages of the TS bases for information only. Millstone TS bases are controlled in accordance with TS Section 6.23, "Technical Specification Bases Control Program."

We request issuance of this amendment no later than April 1, 2006, with the amendment to be implemented within 60 days of issuance to support continued operation past 20 EFPY.

In accordance with 10 CFR 50.91(b), a copy of this license amendment request is being provided to the State of Connecticut.

If you have any questions or require additional information, please contact Mr. Paul R. Willoughby at (804) 273-3572.

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Attachments:

1. Evaluation of Proposed License Amendment
2. Marked-Up TS Pages
3. Re-typed TS Pages
4. Marked-Up Bases pages

Commitments made in this letter: None.

cc: U.S. Nuclear Regulatory Commission
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COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Leslie N. Hartz, who is Vice President - Nuclear Engineering, of Dominion Nuclear Connecticut, Inc. She has affirmed before me that she is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of her knowledge and belief.

Acknowledged before me this 14th day of July, 2005.

My Commission Expires: August 31, 2008.

Margaret B. Bennett
Notary Public

(SEAL)

ATTACHMENT 1

PROPOSED REVISION TO TECHNICAL SPECIFICATIONS (LBDCR 05-MP2-003)
REACTOR COOLANT SYSTEM HEATUP/COOLDOWN LIMITS

EVALUATION OF PROPOSED LICENSE AMENDMENT

MILLSTONE POWER STATION UNIT 2
DOMINION NUCLEAR CONNECTICUT, INC.

PROPOSED REVISION TO TECHNICAL SPECIFICATIONS (LBDCR 05-MP2-003)
REACTOR COOLANT SYSTEM HEATUP/COOLDOWN LIMITS
EVALUATION OF PROPOSED LICENSE AMENDMENT

1.0 DESCRIPTION

Pursuant to 10 CFR 50.90, Dominion Nuclear Connecticut, Inc. (DNC) hereby requests to amend Operating License DPR-65 for Millstone Power Station Unit 2 (MPS2). The enclosed license amendment request proposes to revise Technical Specification 3.4.9.1, "Reactor Coolant System." The proposed changes will modify the reactor coolant system (RCS) heatup and cooldown limits. The associated technical specification bases will be updated to address the proposed changes.

2.0 PROPOSED CHANGE

2.1 The proposed amendment will modify Technical Specification (TS) Table 3.4-2 as follows:

1. Replace the heading "Heatup" with "Heatup*" and add the following note to the bottom of the table "* These limitations also apply to hydrostatic and leak test conditions."

2.2 Cooldown Column:

1. Delete the following cooldown limits:
   a. Limit related to RCS not vented (Indicated Cold Leg Temperature ≤ 100°F)
   b. Limit related to RCS not vented (100°F < Indicated Cold Leg Temperature ≤ 230°F)
   c. Limit related to RCS vent ≥ 2.2 square inches (Indicated Cold Leg Temperature < 190°F)

2. Limit related to Indicated Cold Leg Temperature ≤ 230°F is changed to Indicated Cold Leg Temperature ≤ 220°F. The Limit is changed from ≤ 50°F/hour to ≤ 40°F/hour and the wording "during unanticipated temperature excursions" is deleted.

3. Limit related to Indicated Cold Leg Temperature > 230°F is changed to Indicated Cold Leg Temperature > 220°F. The limit is changed from ≤ 80°F/hour to ≤ 100°F/hour.

2.3 Heatup Column:

1. Limit related to Indicated Cold Leg Temperature ≤ 220°F is changed to Indicated Cold Leg Temperature ≤ 180°F. The limit is changed from ≤ 30°F/hour to ≤ 50°F/hour.

2. Limit related to 220°F < Indicated Cold Leg Temperature ≤ 275°F is deleted.

3. Limit related to Indicated Cold Leg Temperature > 275°F is changed to Indicated Cold Leg Temperature > 180°F.

4. Delete "Inservice Hydrostatic and Leak Testing", Delete "indicated Cold Leg Temperature," and Delete "Limit: ≤ 5 °F/hour for 1 hour prior to and during inservice hydrostatic and leak testing operations above the heatup limit curve."

The old and new limits are summarized in the table below. The use of the proposed RCS pressure-temperature (P-T) limits and associated heatup/cooldown rates is covered in more detail in the addition to the Bases of Technical Specification 3.4.9.1.

CURRENT		PROPOSED	
Heatup		**Heatup***	
Indicated Cold Leg Temperature	**Limit**	**Indicated Cold Leg Temperature**	**Limit**
≤ 220 °F	≤ 30 °F / hour	≤ 180 °F	≤ 50 °F / hour
220 °F < T ≤ 275 °F	≤ 50 °F / hour	> 180 °F	≤ 100 °F / hour
> 275 °F	≤ 100 °F / hour		
Cooldown		**Cooldown**	
Indicated Cold Leg Temperature	**Limit**	**Indicated Cold Leg Temperature**	**Limit**
≤ 100 °F	≤ 5 °F / hour If RCS not vented	≤ 220 °F	≤ 40 °F / hour
100 °F < T ≤ 230 °F	≤ 30 °F / hour If RCS not vented	> 220 °F	≤ 100 °F / hour
< 190 °F	≤ 50 °F / hour If RCS vent ≥ 2.2 square inches		
≤ 230 °F	≤ 50 °F / hour During unanticipated temperature excursions		
> 230 °F	≤ 80 °F / hour		
Hydrostatic Testing			* These limitations also apply to hydrostatic and leak test conditions
Limit			
≤ 5 °F / hour For 1 hour prior to and during inservice hydrostatic and leak testing operations above the heatup limit curve.			

Brief explanation of the changes:

1. Replacement of the separate hydrostatic and leak test limit with the requirement that these conditions do not exceed the heatup limits adds additional administrative margin by requiring that these tests be performed at a higher temperature where there is greater available fracture toughness of the RCS materials. The requirement to remain isothermal (rate ≤ 5°F / hour) for 1 hour prior to and during hydrostatic and leak testing when operating above the heatup curve is no longer needed as operation above the heatup curve is no longer allowed.

2. As a result of the revised fracture mechanics evaluation there is no longer a need for an alternate cooldown limit to accommodate unanticipated temperature excursions. Previously, very restrictive rate or RCS venting requirements were necessary to provide adequate low temperature overpressure protection (LTOP) controls. Currently the proposed rate of 40°F/hour is anticipated to provide adequate flexibility to accommodate unanticipated temperature excursions within the LTOP regime. In addition, the revised fracture mechanics evaluation provides adequate operating margin thereby precluding the necessity to establish RCS vented conditions in conjunction with the normal cooldown curve. These proposed modifications provide adequate operational flexibility concurrent with LTOP protection.

Detailed explanation is provided in section 4.1.

2.4. The proposed amendment will modify TS Figure 3.4-2a and Figure 3.4-2b as follows:

1. Figure 3.4-2a will be replaced with a new curve valid up to 54 EFPY. Figure 3.4-2a addresses plant heatup and is currently valid up to 20 EFPY. The heatup rate limits contained in Table 3.4-2 have been changed in conjunction with the new curve.

2. Figure 3.4-2b will be replaced with a new curve valid up to 54 EFPY. Figure 3.4-2b addresses plant cooldown and is currently valid up to 20 EFPY. The cooldown rate limits contained in Table 3.4-2 have been changed in conjunction with the new curve. The two cooldown curves available when RCS temperature is below 230 °F are replaced by a single curve.

Brief explanation of the changes:

The proposed P-T curves permit a higher RCS pressure for a given RCS temperature, and the proposed heatup and cooldown temperature change rates allow a higher rate than currently allowed. The new curves and associated rates have been calculated using standard approved methods that ensure the margins of safety required by 10CFR50, Appendix G are maintained. Therefore, the proposed changes will have no adverse effect on plant safety.

The impact of the revised curves and rates on the LTOP controls has been evaluated. It has been determined the current LTOP administrative limits set in the technical specifications provide adequate protection to the required LTOP safety requirements. Therefore, the proposed changes will have no adverse effect on plant safety.

Detailed explanation is provided in section 4.1.

2.5. The Bases of the affected Technical Specifications will be revised to discuss the proposed changes. The following changes are incorporated:

1. Page B 3/4 4-6b

   Delete Item 9 discussing pressure / temperature limit applicable to unanticipated operation. This is no longer relevant as the cooldown curve specific to unanticipated operation has been removed from figure 3.4-2b.

   In the final sentence delete "and for inservice and hydrostatic testing," which occurs twice and add the following sentence: "For inservice leak and hydrostatic testing, use of the heatup curve on Figure 3.4-2a and associated rates provide a conservative limit in lieu of a curve developed specifically for inservice leak and hydrostatic testing. Therefore a separate leak and hydrostatic curve is not explicitly included on Figure 3.4-2a."

2. Page B 3/4 4-7

   Replace 161°F with 163°F. Replace 10.5°F with 13°F. Replace 40.5°F with 43°F.

3. Page B 3/4 4-7a

   Add Insert D. Replace RT_{NDT} with Adjusted Reference Temperature (ART). Replace 90°F with 50°F. Replace Branch Technical Position RSB 5-2 with ASME Section XI, Appendix G. Replace 20 EFPY with 54 EFPY. Replace RT_{NDT} with ART. Replace 145°F with 175°F. Replace 263°F with 273°F.

3.0 BACKGROUND

3.1 Results of the Most Recent Capsule Removal and Evaluation

During refueling outage 14, reactor vessel material surveillance capsule W-83 was removed from the reactor vessel for subsequent evaluation and analysis. The capsule specimens were destructively tested and a fluence analysis that considered the actual core history and core loading patterns was performed. The results of this analysis was documented in WCAP-16012, Rev. 0, "Analysis of Capsule W-83 from the Dominion Nuclear Connecticut Millstone Unit 2 Reactor Vessel Surveillance Program," February 2003, which was submitted to the Nuclear Regulatory Commission (NRC) by a letter dated February 26, 2003. This report provided relevant information for use in revising the P-T limits.

The results of the most recent capsule removal and evaluation (capsule W-83) provide the most accurate results available and consider the complete power history and core loading patterns to provide revised projections of accumulated vessel fluence and material degradation.

3.2 Reason for Proposed Amendment

MPS2 TS 3.4.9.1, "Reactor Coolant System," is being revised to incorporate the results of a new analysis that has been performed and to develop new RCS P-T curves and associated heatup and cooldown rate limits.

4.0 TECHNICAL ANALYSIS

4.1 Details of the Proposed Amendment

The enclosed license amendment request proposes to revise Technical Specification 3.4.9.1, "Reactor Coolant System." The proposed changes will modify the RCS pressure / temperature curves and the associated heatup and cooldown rate limits. The associated technical specification bases will be updated to address the proposed changes.

The projected fluence for 54 EFPY was chosen as the basis for the proposed heatup and cooldown limitations. The limiting reactor vessel material was chosen from all reactor vessel materials expected to receive neutron fluence equal to or greater than 1×10^{17} n/cm. As described in position 1.1 of Regulatory Guide 1.99, Rev. 2, chemistry factor (CF) and ART were calculated using Table 1, Table 2 and Equation 2. Application of position 1.1 provided a more conservative CF and ART than use of position 2.1 of the regulatory guide due to the reduced margin term provided by position 2.1.

As described in position 2.2 of Regulatory Guide 1.99, Rev. 2, all available surveillance data was used to predict the limiting material upper shelf energy degradation, as this provided a more conservative shift than position 1.2 of the regulatory guide. All materials have been projected to exceed the 50 ft-lb requirement at 54 EFPY.

The development of the beltline P-T limits was established using ASME Section XI Appendix G, 2002 Addenda. This edition of the Code, approved for use in the 2004 edition of 10 CFR 50, provides a reference fracture toughness curve (K_{Ic}) for establishment of the beltline P-T limits. The additional requirements of 10 CFR 50 Appendix G were also considered in the establishment of the P-T limits.

A revision to the P-T limits has the potential to impact the existing LTOP evaluation and administrative limits. However, the proposed revision to the existing LTOP evaluation has determined the existing LTOP administrative limits described in the technical specifications are still acceptable to protect the new proposed P-T limits and associated rates.

Earlier versions of ASME Section XI, Appendix G, did not provide guidance for determination of the LTOP enable temperature. Therefore, Branch Technical Position RSB 5-2 of NUREG-0800 was used for guidance in earlier LTOP calculations. The currently approved version of ASME Section XI, Appendix G, now provides methodology and requirements for calculation of the LTOP enable temperature. Therefore, the supporting analysis for this submittal was performed in accordance with the currently approved version of ASME Section XI, Appendix G. Reference to Branch Technical Position RSB 5-2 is no longer required or used in the LTOP calculations.

A new analysis has been performed to develop new RCS P-T curves and associated heatup and cooldown rates. The new heatup and cooldown rates will be increased to provide flexibility during plant heatup and cooldown, and especially during equipment manipulations such as securing reactor coolant pumps (RCPs), swapping shutdown cooling (SDC) heat exchangers, and initiating SDC. The need to increase heatup and cooldown rates was identified during the review of the MPS2 Licensee Event Report (LER) 95-030-00, "Violation of Technical Specification 3.0.4 During Reactor Plant Heatup," dated August 22, 1995, and LER 96-001-00, "Reactor Coolant System Heatup Rate Exceeded Technical Specification Limit," dated January 30, 1996. These heatup/cooldown events resulted in violation of technical specification requirements. The new analysis also incorporates updated instrument uncertainties.

Figure 3.4-2a addresses plant heatup and is currently valid up to 20 EFPY. With the proposed change, Figure 3.4-2a will be replaced with a new curve valid up to 54 EFPY. The associated heatup rate limits contained in Table 3.4-2 have been changed as a result of the new analysis. The new rate limits have been simplified and updated for greater consistency between heatup and cooldown. The hydrostatic and leak test limit are now administratively controlled by the heatup limit and not explicitly shown on the figure.

Figure 3.4-2b addresses plant cooldown and is currently valid up to 20 EFPY. With the proposed change, Figure 3.4-2b will be replaced with a new curve valid up to 54 EFPY. The associated cooldown rate limits contained in Table 3.4-2 have been changed as a result of the new analysis. Previously, very restrictive rate or RCS venting requirements were necessary to provide adequate LTOP controls. Currently the proposed rate of 40°F/hour is anticipated to provide adequate flexibility to accommodate unanticipated temperature excursions within the LTOP regime. In addition, the revised fracture mechanics evaluation provides adequate operating margin thereby precluding the necessity to establish RCS vented conditions in conjunction with the normal cooldown curve. These proposed modifications provide adequate operational flexibility concurrent with LTOP protection. The distinction between operation with the RCS vented and not vented and the multiple cooldown rates available below 230°F are no longer required and have been removed.

4.2 Safety Summary

The proposed changes will modify the RCS P-T limits and associated heatup and cooldown rates. The majority of the proposed changes are being made as a result of the new P-T and LTOP analyses performed. The new P-T curves and associated heatup and cooldown rates were developed in accordance with the requirements and methods described in 10CFR50 Appendix G and are consistent with the criteria contained in the Standard Review Plan Section 5.3.2. This safety assessment will evaluate the safety significance of the above changes.

RCS Heatup and Cooldown Changes

1. A new analysis has been performed to develop new RCS P-T curves and associated heatup and cooldown rate limits. The heatup and cooldown rates will be increased to provide flexibility during plant heatup and cooldown, and especially during equipment manipulations such as securing RCPs, swapping SDC heat exchangers, and initiating SDC. The new curves have been calculated using standard approved methods that ensure the margins of safety required by 10CFR50, Appendix G are maintained. Therefore, the proposed changes will have no adverse effect on plant safety.

   The new analysis includes updates to the design inputs not reflected in the current analysis. These updates include the following items:

a. Revised instrument uncertainties have been incorporated in the development of the MPS2 heatup and cooldown curves. The revised uncertainties reflect a decrease in the uncertainty associated with monitoring RCS pressure and an increase in the uncertainty associated with monitoring RCS temperature. This proposed change will have no adverse effect on plant safety.

b. The population of reactor vessel materials included in the selection of the most limiting reactor vessel material has been increased to include all materials projected to receive a neutron fluence of at least 1 x 10^{17} n/cm^2 at 54 EFPY. The limiting materials remain unchanged from the prior P-T calculations. This proposed change will have no adverse effect on plant safety.

2. Figure 3.4-2a has been modified to remove the hydrostatic and leak test limit line. The hydrostatic and leak test limit will now be administratively controlled by the heatup limit. Administratively limiting hydrostatic and leak tests to the heatup limit provides additional margin to the Appendix G requirements. Table 3.4-2 has been modified to remove the Inservice Hydrostatic and Leak Testing item and to add a note indicating heatup limitations also apply to hydrostatic and leak test conditions. The requirement to remain isothermal (rate ≤ 5°F / hour) for 1 hour prior and during hydrostatic and leak test above the heatup curve is no longer needed as operation above the heatup curve is no longer allowed. These proposed changes will have no adverse effect on plant safety.

3. In some cases the proposed heatup and cooldown temperature change rates allow a higher rate than currently allowed. However, the new curves and associated rates have been calculated using standard approved methods that ensure the margins of safety required by 10CFR50, Appendix G are maintained. Therefore, the proposed changes will have no adverse effect on plant safety.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

In accordance with 10CFR50.92, DNC has reviewed the proposed changes and has concluded that they do not involve a significant hazards consideration (SHC). The basis for this conclusion is that the three criteria of 10CFR50.92(c) are not compromised:

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

   Response: No.

The proposed changes are a result of the new analysis of the RCS P-T limits and associated heatup/cooldown rates. These changes will support plant operation to 54 EFPY and provide flexibility during plant heatup and cooldown, especially during equipment manipulations such as securing RCPs, swapping SDC heat exchangers, and initiating SDC.

The hydrostatic and leak test limit will now be administratively controlled by the heatup limit. Administratively limiting hydrostatic and leak tests to the heatup limit provides additional margin to the Appendix G requirements. Table 3.4-2 has been modified to remove the Inservice Hydrostatic and Leak Testing item and to add a note indicating heatup limitations also apply to hydrostatic and leak test conditions. The requirement to remain isothermal (rate ≤ 5°F / hour) for 1 hour prior and during hydrostatic and leak test above the heatup curve is no longer needed as operation above the heatup curve is no longer allowed.

The proposed changes to the RCS P-T limits and rates of temperature change are based on the new analysis. This analysis uses standard approved methods that ensure the margins of safety required by 10CFR50, Appendix G are maintained. The other changes discussed are more restrictive enhancements to technical specification requirements. Therefore, the proposed changes will not result in a significant increase in the probability or consequences of an accident previously evaluated.

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

   Response: No.

   The proposed changes will not alter the plant configuration (no new or different type of equipment will be installed) or require any new or unusual operator actions. They do not alter the way any structure, system, or component functions. The increased heatup and cooldown rates are bounded by the existing accident analysis. The proposed changes do not introduce any new failure modes. Therefore, the proposed changes will not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

   Response: No.

   The proposed changes will modify the RCS P-T limits, and the RCS heatup and cooldown rate limits. The proposed changes are being made as a result of the new P-T and LTOP analyses performed. The new P-T curves and heatup and cooldown rates are developed in accordance with the requirements and methods described in 10CFR50 Appendix G and are consistent with the criteria contained in the Standard Review Plan Section 5.3.2. This will ensure the integrity of the reactor vessel is maintained during all aspects of plant operation. Therefore, there is no significant effect on the probability or consequences of any accident previously evaluated and no significant impact on offsite doses associated with previously evaluated accidents. This license amendment request does not result in a reduction of the margin of safety as defined in the bases for the technical specifications addressed by the proposed changes.

As described above, this license amendment request does not impact the probability of an accident previously evaluated, does not involve a significant increase in the consequences of an accident previously evaluated, does not create the possibility of a new or different kind of accident from any accident previously evaluated, and does not result in a significant reduction in a margin of safety. Therefore, DNC has concluded that the proposed changes do not involve a SHC.

5.2 Applicable Regulatory Requirements/Criteria

The U. S. Nuclear Regulatory Commission (NRC) has established requirements in Appendix G to 10 CFR Part 50 to protect the integrity of the reactor coolant pressure boundary in nuclear power plants. Appendix G to 10 CFR Part 50 also incorporates, by reference, the requirements found in Appendix G to Section XI of the ASME Boiler and Pressure Vessel Code (the Code) as the basis for the establishment of facility P-T limit curves. Regulatory Guide 1.99, Rev. 2, "Radiation Embrittlement of Reactor Vessel Materials," contains methodologies for determining the increase in ductile-to-brittle transition temperature and the decrease in upper-shelf energy resulting from neutron radiation, which is used as input to the P-T Limit and LTOP calculations. Standard Review Plan (SRP) Section 5.3.2, "Pressure-Temperature Limits and Pressurized Thermal Shock" provides additional guidance applicable to the development of P-T limits.

The development of the P-T and LTOP limits were established using ASME Section XI Appendix G, 2002 Addenda. This edition of the Code, approved for use in the 2004 edition of 10 CFR 50, provides a reference fracture toughness curve (K_{Ic}) for establishment of the beltline P-T limits. The additional requirements of 10 CFR 50 Appendix G were considered in the establishment of the P-T limits.

6.0 ENVIRONMENTAL CONSIDERATION

DNC has determined that the proposed amendment would change requirements with respect to use of a facility component located within the restricted area, as defined by 10 CFR 20, or it would change inspection or surveillance requirements.

DNC has evaluated the proposed change and has determined that the change 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 off site, 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(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

ATTACHMENT 2

PROPOSED REVISION TO TECHNICAL SPECIFICATIONS (LBDCR 05-MP2-003) REACTOR COOLANT SYSTEM HEATUP/COOLDOWN LIMITS

TECHNICAL SPECIFICATIONS MARKED-UP PAGES

MILLSTONE POWER STATION UNIT 2
DOMINION NUCLEAR CONNECTICUT, INC.

REACTOR COOLANT SYSTEM

For Information Only

3/4.4.9 PRESSURE/TEMPERATURE LIMITS

REACTOR COOLANT SYSTEM

LIMITING CONDITION FOR OPERATION

3.4.9.1 Reactor Coolant System (except the pressurizer) temperature, pressure, and heatup and cooldown rates shall be limited in accordance with the limits specified in Table 3.4-2 and shown on Figures 3.4-2a and 3.4-2b.

APPLICABILITY: At all times.

ACTION:

a. With any of the above limits exceeded in MODES 1, 2, 3, or 4, perform the following:

    1. Restore the temperature and/or pressure to within limit within 30 minutes.

    AND

    2. Perform an engineering evaluation to determine the effects of the out of limit condition on the structural integrity of the Reactor Coolant System and determine that the Reactor Coolant System remains acceptable for continued operation within 72 hours. Otherwise, be in at least MODE 3 within the next 6 hours and in MODE 5 with RCS pressure less than 300 psia within the following 30 hours.

b. With any of the above limits exceeded in other than MODES 1, 2, 3, or 4, perform the following:

    1. Immediately initiate action to restore the temperature and/or pressure to within limit.

    AND

    2. Perform an engineering evaluation to determine the effects of the out of limit condition on the structural integrity of the Reactor Coolant System and determine that the Reactor Coolant System is acceptable for continued operation prior to entering MODE 4.

REACTOR COOLANT SYSTEM

For Information Only

SURVEILLANCE REQUIREMENTS

4.4.9.1

a. The Reactor Coolant System temperature and pressure shall be determined to be within the limits at least once per 30 minutes during system heatup, cooldown, and inservice leak and hydrostatic testing operations.

b. DELETED

TABLE 3.4-2

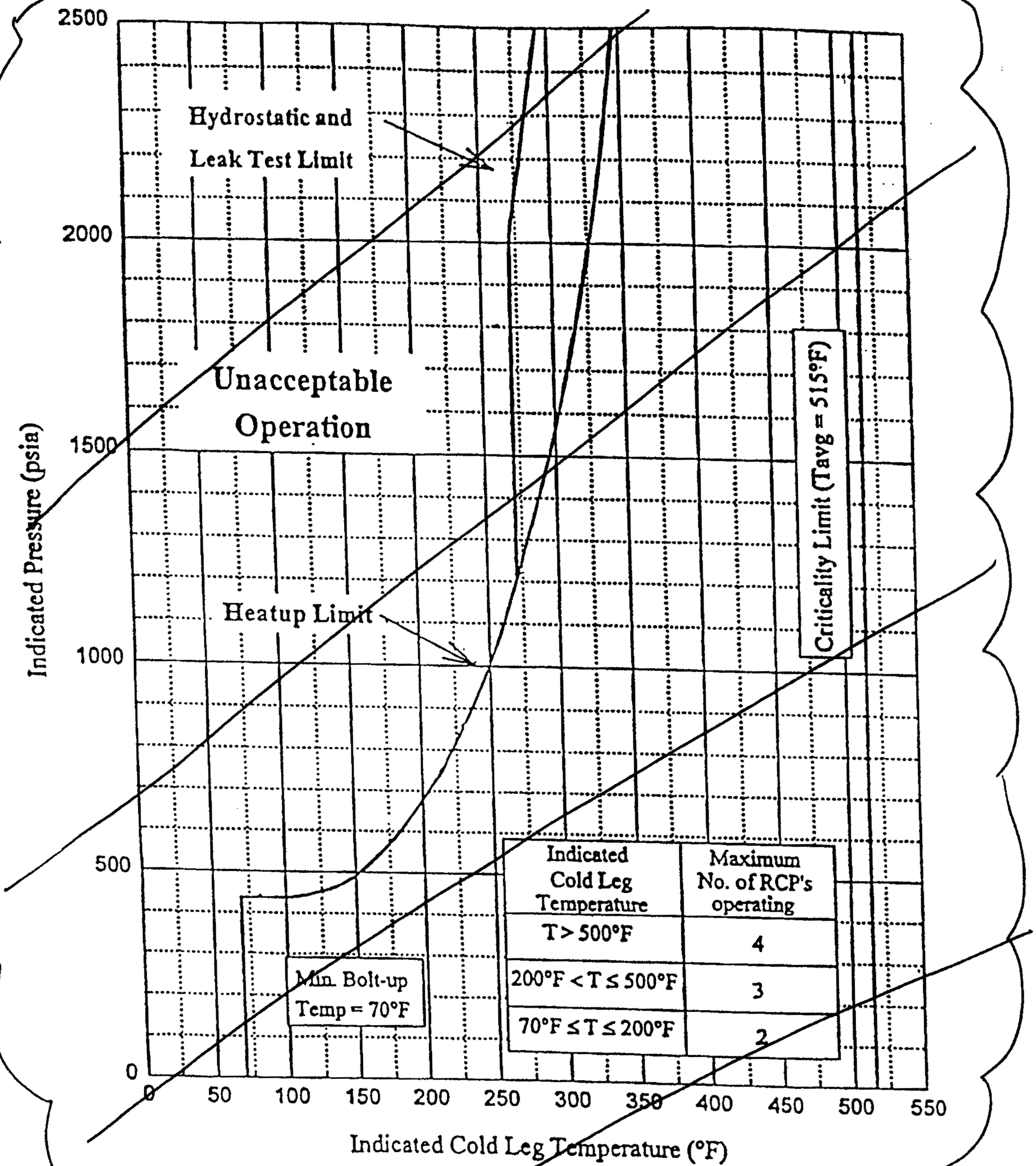
REACTOR COOLANT SYSTEM HEATUP AND COOLDOWN LIMITS

Cooldown		Heatup (*)	
Indicated Cold Leg Temperature	Limit	Indicated Cold Leg Temperature	Limit
≤ 100°F	≤ 5°F/hour if RCS not vented.	≤ ~~220~~ 180°F	≤ ~~30~~ 50°F/hour
100°F < T ≤ 230°F	≤ 30°F/hour if RCS not vented.	220°F < T ≤ 275°F	≤ 50°F/hour
< 190°F	≤ 50°F/hour if RCS vent ≥ 2.2 square inches.	> ~~275~~ 180°F	≤ 100°F/hour
≤ ~~230~~ 220°F	≤ ~~50~~ 40°F/hour during unanticipated temperature excursions.		
> ~~230~~ 220°F	≤ ~~80~~ 100°F/hour		
		Inservice Hydrostatic and Leak Testing	
		Indicated Cold Leg Temperature	≤ 5°F/hour for 1 hour prior to and during inservice hydrostatic and leak testing operations above the heatup limit curve.

* These limitations also apply to Hydrostatic and leak test Conditions

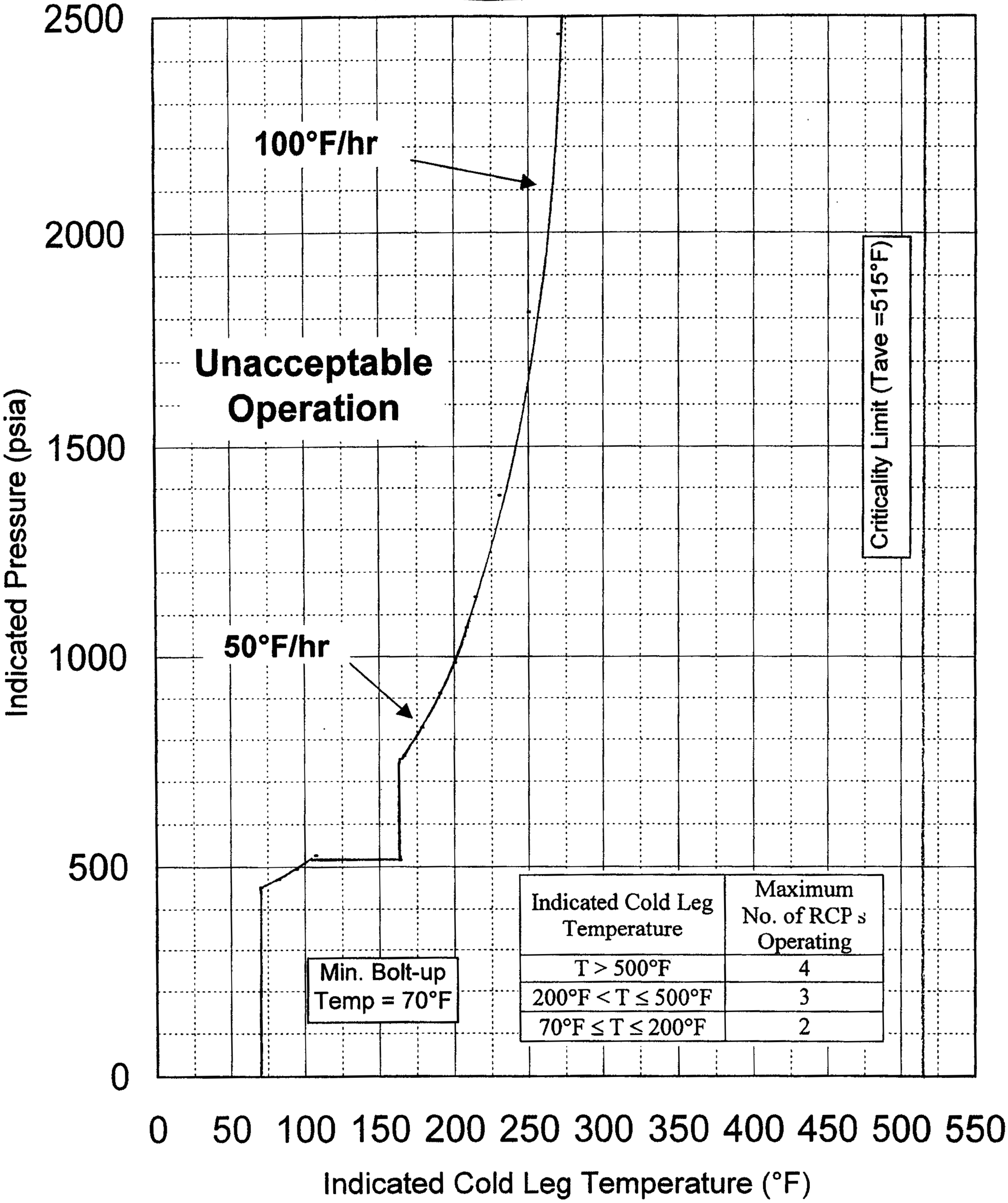
Replace with Insert A

~~July 1, 1998~~



Millstone Unit 2 Reactor Coolant System
Heatup Limitations for Up to 20 EFPY
Figure 3.4-2a

Insert A - Page 3/4 4-19a

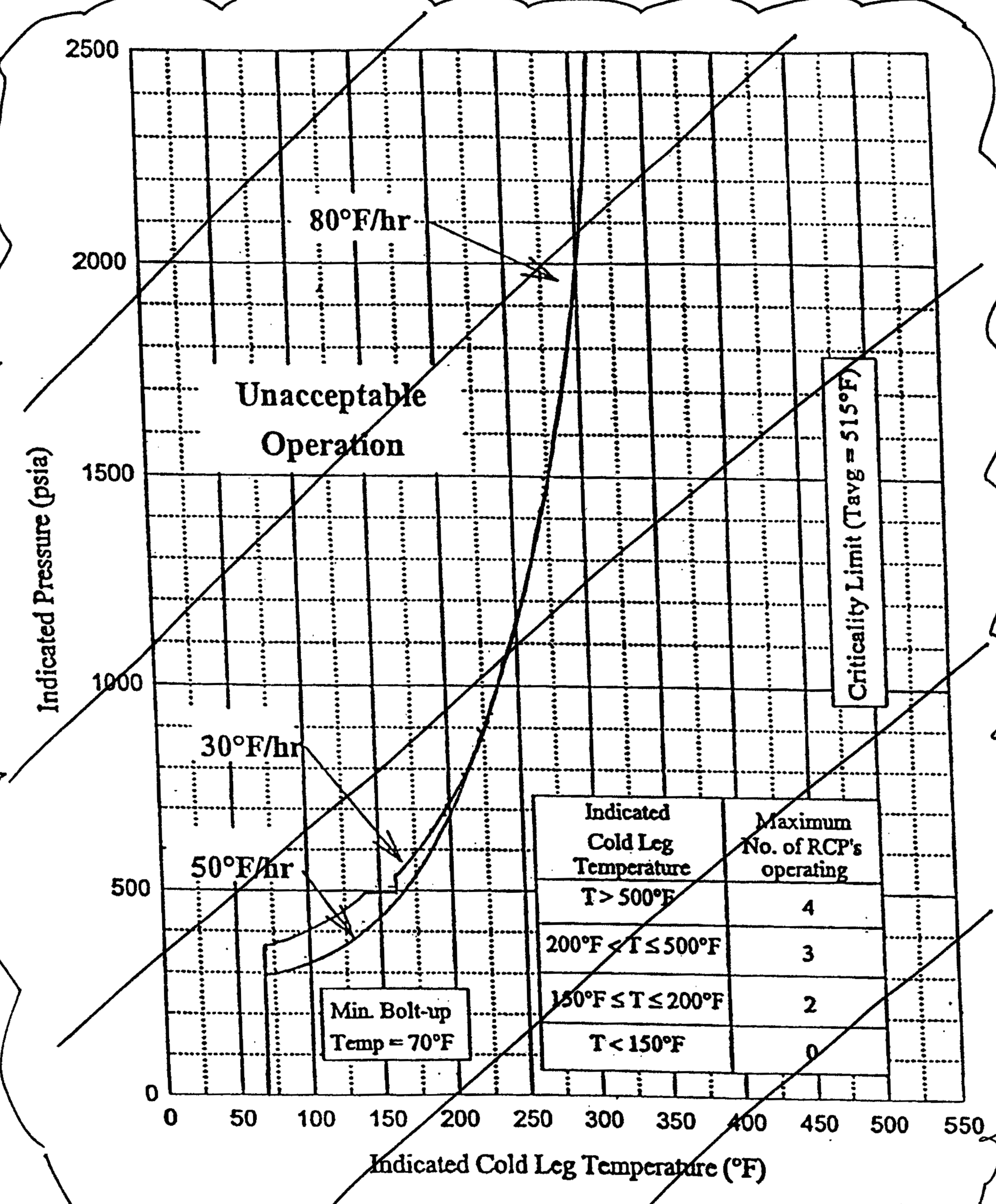


Millstone Unit 2 Reactor Coolant System Heatup Limitations for up to 54 EFPY

Figure 3.4-2a

Replace with Insert B

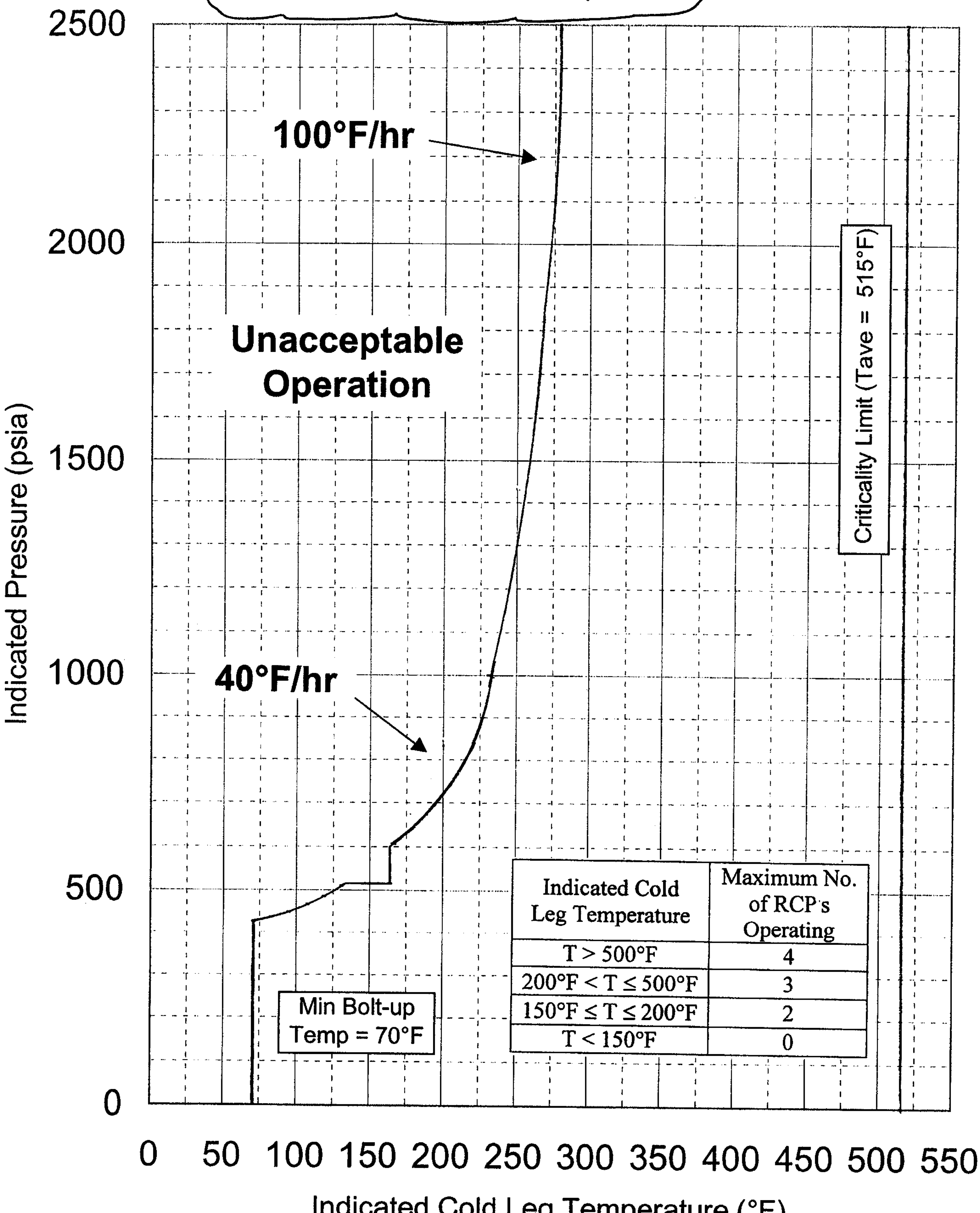
~~July 1, 1998~~



Indicated Cold Leg Temperature	Maximum No. of RCP's operating
T > 500°F	4
200°F < T ≤ 500°F	3
150°F ≤ T ≤ 200°F	2
T < 150°F	0

Millstone Unit 2 Reactor Coolant System
Cooldown Limitations for Up to 20 EFPY
Figure 3.4-2b

Insert B to page 3/4 4-19b



Indicated Cold Leg Temperature	Maximum No. of RCP's Operating
T > 500°F	4
200°F < T ≤ 500°F	3
150°F ≤ T ≤ 200°F	2
T < 150°F	0

Millstone Unit 2 Reactor Coolant System Cooldown Limitations for up to 54 EFPY

Figure 3.4-2b

ATTACHMENT 3

PROPOSED REVISION TO TECHNICAL SPECIFICATIONS (LBDCR 05-MP2-003) REACTOR COOLANT SYSTEM HEATUP/COOLDOWN LIMITS

TECHNICAL SPECIFICATIONS RE-TYPED PAGES

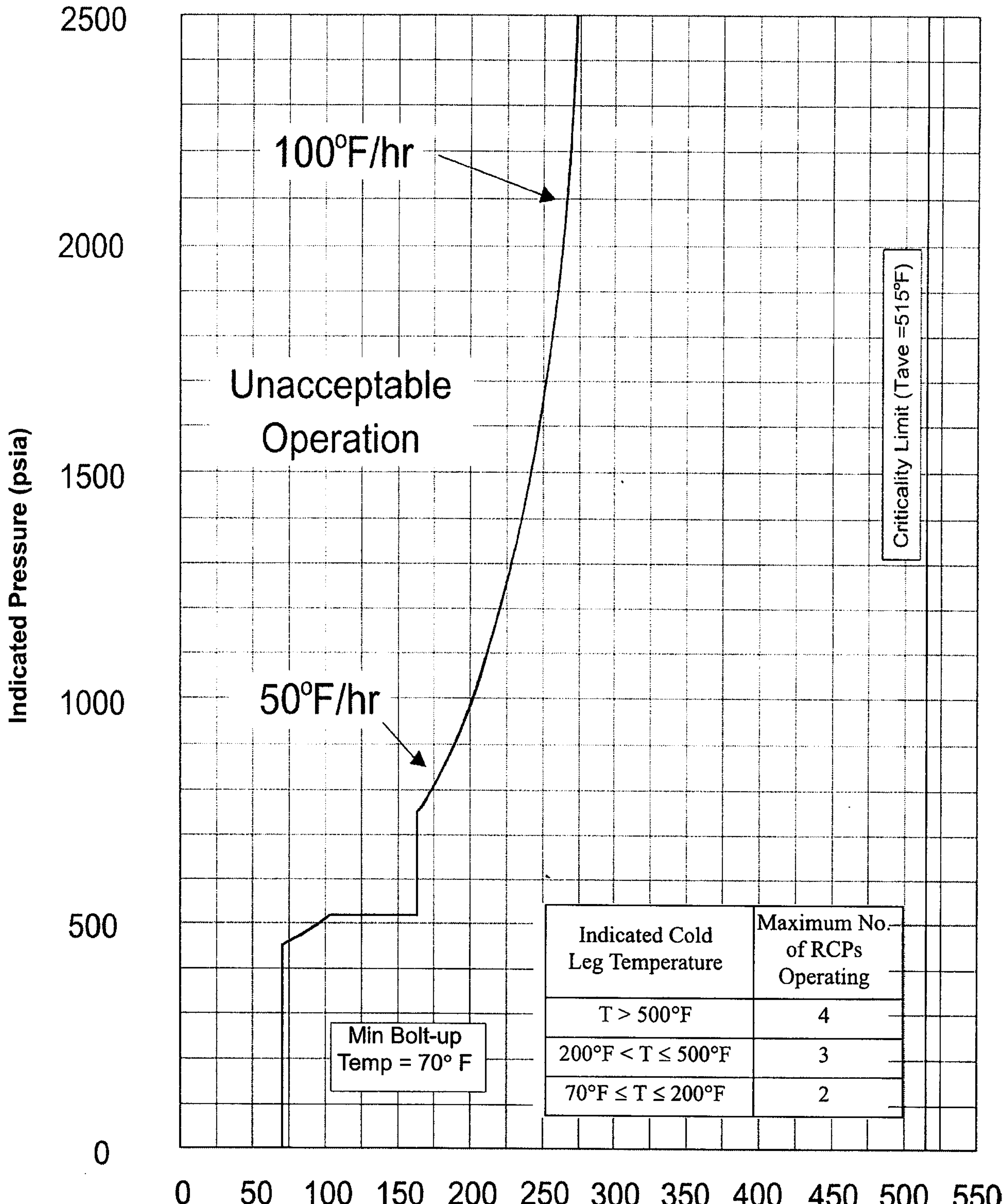
MILLSTONE POWER STATION UNIT 2
DOMINION NUCLEAR CONNECTICUT, INC.

TABLE 3.4-2

REACTOR COOLANT SYSTEM
HEATUP AND COOLDOWN LIMITS

Cooldown		Heatup*	
Indicated Cold Leg Temperature	Limit	Indicated Cold Leg Temperature	Limit
≤ 220°F	≤ 40°F/hour	≤ 180°F	≤ 50°F/hour
> 220°F	≤ 100°F/hour	> 180°F	≤ 100°F/hour

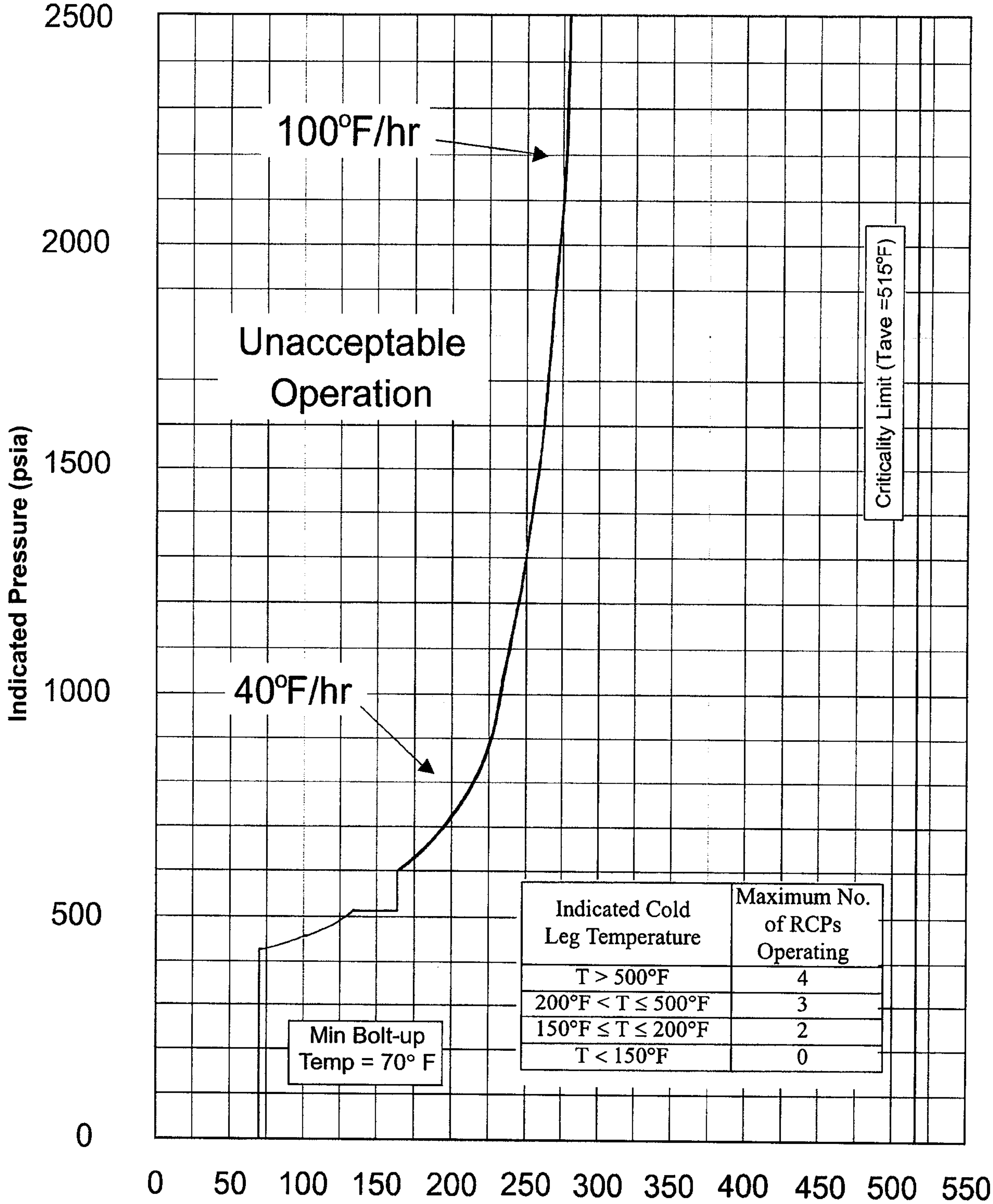
* These limitations also apply to hydrostatic and leak test conditions.



Indicated Cold Leg Temperature	Maximum No. of RCPs Operating
T > 500°F	4
200°F < T ≤ 500°F	3
70°F ≤ T ≤ 200°F	2

Indicated Cold Leg Temperature (°F)

Millstone Unit 2 Reactor Coolant System
Heatup Limitations for Up to 54 EFPY
Figure 3.4-2a



Indicated Cold Leg Temperature (°F)
Millstone Unit 2 Reactor Coolant System
Cooldown Limitations for Up to 54 EFPY
Figure 3.4-2b

ATTACHMENT 4

PROPOSED REVISION TO TECHNICAL SPECIFICATIONS (LBDCR 05-MP2-003) REACTOR COOLANT SYSTEM HEATUP/COOLDOWN LIMITS

BASES MARKED-UP PAGES

MILLSTONE POWER STATION UNIT 2
DOMINION NUCLEAR CONNECTICUT, INC.

Reducing T_{avg} to < 515°F prevents the release of activity should a steam generator tube rupture since the saturation pressure of the primary coolant is below the lift pressure of the atmospheric steam relief valves. The surveillance requirements provide adequate assurance that excessive specific activity levels in the primary coolant will be detected in sufficient time to take corrective action. Information obtained on iodine spiking will be used to assess the parameters associated with iodine spiking phenomena. A reduction in frequency of isotopic analyses following power changes may be permissible if justified by the data obtained.

3/4.4.9 PRESSURE/TEMPERATURE LIMITS

All components in the Reactor Coolant System are designed to withstand the effects of cyclic loads due to system temperature and pressure changes. These cyclic loads are introduced by normal load transients, reactor trips, and startup and shutdown operations. The various categories of load cycles used for design purposes are provided in Section 4.0 of the FSAR. During startup and shutdown, the rates of temperature and pressure changes are limited so that the maximum specified heatup and cooldown rates are consistent with the design assumptions and satisfy the stress limits for cyclic operation. In addition, during heatup and cooldown evolutions, the RCS ferritic materials transition between ductile and brittle (non-ductile) behavior. To provide adequate protection, the pressure/temperature limits were developed in accordance with the 10CFR50 Appendix G requirements to ensure the margins of safety against non-ductile failure are maintained during all normal and anticipated operational occurrences. These pressure/temperature limits are provided in Figures 3.4-2a and 3.4-2b and the heatup and cooldown rates are contained in Table 3.4-2.

During heatup, the thermal gradients in the reactor vessel wall produce thermal stresses which vary from compressive at the inner wall to tensile at the outer wall. These thermally induced compressive stresses at the inside wall tend to alleviate the tensile stresses induced by the internal pressure. Therefore, a pressure- temperature curve based on steady state conditions (i.e., no thermal stresses) represents a lower bound of all similar curves for finite heatup rates when the inner wall of the vessel is treated as the governing location.

The heatup analysis also covers the determination of pressure-temperature limitations for the case in which the outer wall of the vessel becomes the controlling location. The thermal gradients established during heatup produce tensile stresses at the outer wall of the vessel. These stresses are additive to the pressure induced tensile stresses which are already present. The thermally induced stresses at the outer wall of the vessel are tensile and are dependent on both the rate of heatup and the time along the heatup ramp; therefore, a lower bound curve similar to that described for the heatup of the inner wall cannot be defined. Subsequently, for the cases in which the outer wall of the vessel becomes the stress controlling location, each heatup rate of interest must be analyzed on an individual basis.

The heatup and cooldown limit curves (Figures 3.4-2a and 3.4-2b) are composite curves which were prepared by determining the most conservative case, with either the inside or outside wall controlling, for any heatup or cooldown rates of up to the maximums described in Technical Specification 3.4.9.1, Table 3.4-2. The heatup and cooldown curves were prepared based upon the most limiting value of the predicted adjusted reference temperature at the end of the service period indicated on Figures 3.4-2a and 3.4-2b.

Verification that RCS pressure and temperature conditions are within the limits of Figures 3.4-2a and 3.4-2b and Table 3.4-2, at least once per 30 minutes, is required when undergoing planned changes of ≥ 10°F or ≥ 100 psi. This frequency is considered reasonable since the location of interest during cooldown is over two inches (i.e. 1/4 t location) from the interface with the reactor coolant. During heatup the location of interest is over six inches from the interface with the reactor coolant. This combined with the relatively large heat retention capability of the reactor vessel ensures that small temperature fluctuations such as those expected during normal heatup and cooldown evolutions do not challenge the structural integrity of the reactor vessel when monitored on a 30 minute frequency. The 30 minute time interval permits assessment and correction for minor deviations within a reasonable time.

During RCS heatup and cooldown the magnitude of the stresses across the reactor vessel wall are controlled by restricting the rate of temperature change and the system pressure. The RCS pressure/temperature limits are provided in Figures 3.4-2a and 3.4-2b, and the heatup and cooldown rates are contained in Table 3.4-2. The following guidelines should be used to ensure compliance with the Technical Specification limits.

1. When changing RCS temperature, with any reactor coolant pumps in operation, the rate of temperature change is calculated by using RCS loop cold leg temperature indications.

   This also applies during parallel reactor coolant pump and shutdown cooling (SDC) pump operation because the RCS loop cold leg temperature is the best indication of the temperature of the fluid in contact with the reactor vessel wall. Even though SDC return temperature may be below RCS cold leg temperature, the mixing of a large quantity of RCS cold leg water and a small quantity of SDC return water will result in the temperature of the water reaching the reactor vessel wall being very close to RCS cold leg temperature.

2. When changing RCS temperature via natural circulation, the rate of temperature change is calculated by using RCS loop cold leg temperature indications.

3. When changing RCS temperature with only SDC in service, the rate of temperature change is calculated by using SDC return temperature indication.

4. During the transition from natural circulation flow, to forced flow with SDC pumps, the rate of temperature change is calculated by using RCS loop cold leg temperature indications. SDC return temperature should be used to calculate the rate of temperature change after SDC is in service, RBCCW flow has been established to the SDC heat exchanger(s), and SDC return temperature has decreased below RCS cold leg temperature.

5. During the transition from parallel reactor coolant pump and SDC pump operation, the rate of temperature change is calculated by using RCS loop cold leg temperature indications until all reactor coolant pumps are secured. SDC return temperature should be used to calculate the rate of temperature change after all reactor coolant pumps have been secured.

6. The temperature change limits are for a continuous one hour period. Verification of operation within the limit must compare the current RCS water temperature to the value that existed one hour before the current time. If the maximum temperature increase or decrease, during this one hour period, exceeds the Technical Specification limit, appropriate action should be taken.

7. When a new, more restrictive temperature change limit is approached, it will be necessary to adjust the current temperature change rate such that as soon as the new rate applies, the total temperature change for the previous one hour does not exceed the new more restrictive rate.

   The same principle applies when moving from one temperature change limit curve to another. If the new curve is above the current curve (higher RCS pressure for a given RCS temperature), the new curve will reduce the temperature change limit. It will be necessary to first ensure the new more restrictive temperature change limit will not be exceeded by looking at the total RCS temperature change for the previous one hour time period. If the magnitude of the previous one hour temperature change will exceed the new limit, RCS temperature should be stabilized to allow the thermal stresses to dissipate. This may require up to a one hour soak before RCS pressure may be raised within the limits of the new curve.

   If the new curve is below the current curve (lower RCS pressure for a given RCS temperature), the new curve will allow a higher temperature change limit. All that is necessary is to lower RCS pressure, and then apply the new higher temperature change limit.

8. When performing evolutions that may result in rapid and significant temperature swings (e.g. placing SDC in service or shifting SDC heat exchangers), the total temperature change limit for the previous one hour period must not be exceeded. If a significant temperature change is anticipated, and an RCS heatup or cooldown is in progress, the plant should be stabilized for up to one hour, before performing this type of evolution. Stabilizing the plant for up to one hour will allow the thermal stresses, from any previous RCS temperature change, to dissipate. This will allow rapid RCS temperature changes up to the applicable Technical Specification temperature change limit.

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~~July 1, 1998~~

9. ~~Additional margin, to prevent exceeding the Appendix G limits when RCS temperature is at or below 230°F, can be obtained by maintaining RCS pressure below the pressure allowed by the 50°F/hr cooldown curve provided on Figure 3.4-2b. This will ensure that if a greater than anticipated temperature excursion occurs during short duration evolutions, the margins of safety required by Appendix G will not be exceeded. Examples of plant evolutions that may result in unanticipated temperature excursions include placing SDC in service without parallel RCP operation, securing RCPs when SDC is already in service, shifting SDC heat exchangers, and switching SDC pumps. Establishing a lower RCS pressure, will minimize the probability of exceeding Appendix G limits.~~

~~If the 50°F/hr cooldown curve is used to evaluate unanticipated temperature excursions while limited to a cooldown rate of 30°F/hr, the RCS cooldown rate must be restored to within the 30°F/hr limit as soon as practical. This may require a soak period to allow the thermal stresses, from the previous RCS temperature change, to dissipate.~~

The reactor vessel materials have been tested to determine their initial RT_{NDT}; the results of these tests are shown in Table 4.6-1 of the Final Safety Analysis Report. Reactor operation and resultant fast neutron irradiation will cause an increase in the RT_{NDT}. Therefore, an adjusted reference temperature, based upon the fluence, can be predicted using the methods described in Revision 2 to Regulatory Guide 1.99.

The heatup and cooldown limit curves shown on Figures 3.4-2a and 3.4-2b include predicted adjustments for this shift in RT_{NDT} at the end of the applicable service period, as well as adjustments for possible uncertainties in the pressure and temperature sensing instruments. The adjustments include the pressure and temperature instrument and loop uncertainties associated with the main control board displays, the pressure drop across the core (RCP operation), and the elevation differences between the location of the pressure transmitters and the vessel beltline region. In addition to these curve adjustments, the LTOP evaluation includes adjustments due to valve stroke times, PORV circuitry reaction times, and valve discharge backpressure.

The actual shift in RT_{NDT} of the vessel material is established periodically during operation by removing and evaluating, in accordance with 10CFR50 Appendix H, reactor vessel material irradiation surveillance specimens installed near the inside wall of the reactor vessel in the core area. Since the neutron spectra at the irradiation samples and vessel inside radius are similar, the measured transition shift for a sample can be correlated to the adjacent section of the reactor vessel. The heatup and cooldown curves must be recalculated when the ΔRT_{NDT} determined from the surveillance capsule exceeds the calculated ΔRT_{NDT} for the equivalent capsule radiation exposure.

The pressure-temperature limit lines shown on Figures 3.4-2a and ~~3~~.4-2b for reactor criticality ~~and for inservice leak and hydrostatic testing~~ have been provided to assure compliance with the minimum temperature requirements of Appendix G to 10 CFR 50 ~~for reactor~~ criticality ~~and for inservice leak and hydrostatic testing~~. Insert C

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Insert C to Page B 3/4 4-6b

For inservice leak and hydrostatic testing, use of the heatup curve on Figure 3.4-2a and associated rates provide a conservative limit in lieu of a curve developed specifically for inservice leak and hydrostatic testing. Therefore a separate leak and hydrostatic curve is not explicitly included on Figure 3.4-2a

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REACTOR COOLANT SYSTEM

BASES

The maximum RT_{NDT} for all reactor coolant system pressure-retaining materials, with the exception of the reactor pressure vessel, has been determined to be 50°F. The Lowest Service Temperature limit is based upon this RT_{NDT} since Article NB-2332 (Summer Addenda of 1972) of Section III of the ASME Boiler and Pressure Vessel Code requires the Lowest Service Temperature to be RT_{NDT} + 100°F for piping, pumps and valves. Below this temperature, the system pressure must be limited to a maximum of 20% of the system's hydrostatic test pressure of 3125 psia. Operation of the RCS within the limits of the heatup and cooldown curves will ensure compliance with this requirement.

Included in this evaluation is consideration of flange protection in accordance with 10 CFR 50, Appendix G. The requirement makes the minimum temperature RT_{NDT} plus 90°F for hydrostatic test and RT_{NDT} plus 120°F for normal operation when the pressure exceeds 20 percent of the preservice system hydrostatic test pressure. Since the flange region RT_{NDT} has been calculated to be 30°F, the minimum flange pressurization temperature during normal operation is 150°F (~~161~~ 163°F with instrument uncertainty) when the pressure exceeds 20% of the preservice hydrostatic pressure. Operation of the RCS within the limits of the heatup and cooldown curves will ensure compliance with this requirement.

To establish the minimum boltup temperature, ASME Code Section XI, Appendix G, requires the temperature of the flange and adjacent shell and head regions shall be above the limiting RT_{NDT} temperature for the most limiting material of these regions. The RT_{NDT} temperature for that material is 30°F. Adding ~~10.5~~ 13°F, for temperature measurement uncertainty, results in a minimum boltup temperature of ~~40.5~~ 43°F. For additional conservatism, a minimum boltup temperature of 70°F is specified on the heatup and cooldown curves. The head and vessel flange region temperature must be greater than 70°F, whenever any reactor vessel stud is tensioned.

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The Low Temperature Overpressure Protection (LTOP) System provides a physical barrier against exceeding the 10CFR50 Appendix G pressure/temperature limits during low temperature RCS operation either with a steam bubble in the pressurizer or during water solid conditions. This system consists of either two PORVs (each PORV is equivalent to a vent of approximately 1.4 square inches) with a pressure setpoint ≤ 415 psia, or an RCS vent of sufficient size. Analysis has confirmed that the design basis mass addition transient discussed below will be mitigated by operation of the PORVs or by establishing an RCS vent of sufficient size.

The LTOP System is required to be OPERABLE when RCS cold leg temperature is at or below 275°F (Technical Specification 3.4.9.3). However, if the RCS is in MODE 6 and the reactor vessel head has been removed, a vent of sufficient size has been established such that RCS pressurization is not possible. Therefore, an LTOP System is not required (Technical Specification 3.4.9.3 is not applicable).

Insert D

The LTOP System is armed at a temperature which exceeds the limiting 1/4t ~~RT_{NDT}~~ ART plus 50 ~~90~~°F as required by ~~NUREG-0800 (i.e., SRP), Branch Technical Position RSB 5-2~~ ASME Section XI, Appendix G. For the operating period up to 54 ~~20~~ EFPY, the limiting 1/4t ~~RT_{NDT}~~ ART is 175 ~~145~~°F which results in a minimum LTOP System enable temperature of at least 273 ~~263~~°F when corrected for instrument uncertainty. The current value of 275°F will be retained.

The mass input analysis performed to ensure the LTOP System is capable of protecting the reactor vessel assumes that all pumps capable of injecting into the RCS start, and then one PORV fails to actuate (single active failure). Since the PORVs have limited relief capability, certain administrative restrictions have been implemented to ensure that the mass input transient will not exceed the relief capacity of a PORV. The analysis has determined two PORVs (assuming one PORV fails) are sufficient if the mass addition transient is limited to the inadvertent start of one high pressure safety injection (HPSI) pump and two charging pumps when RCS temperature is at or below 275°F and above 190°F, and the inadvertent start of one charging pump when RCS temperature is at or below 190°F.

The assumed active failure of one PORV results in an equivalent RCS vent size of approximately 1.4 square inches when the one remaining PORV opens. Therefore, a passive vent of at least 1.4 square inches can be substituted for the PORVs. However, a vent size of at least 2.2 square inches will be required when VENTING the RCS. If the RCS is depressurized and vented through at least a 2.2 square inch vent, the peak RCS pressure, resulting from the maximum mass input transient allowed by Technical Specification 3.4.9.3, will not exceed 300 psig (SDC System suction side design pressure).

When the RCS is at or below 190°F, additional pumping capacity can be made capable of injecting into the RCS by establishing an RCS vent of at least 2.2 square inches. Removing a pressurizer PORV or the pressurizer manway will result in a passive vent of at least 2.2 square inches. Additional methods to establish the required RCS vent are acceptable, provided the proposed vent has been evaluated to ensure the flow characteristics are equivalent to one of these.

Establishing a pressurizer steam bubble of sufficient size will be sufficient to protect the reactor vessel from the energy addition transient associated with the start of an RCP, provided the restrictions contained in Technical Specification 3.4.1.3 are met. These restrictions limit the heat

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Insert D to page B 3/4 4-7a

Adjusted Referenced Temperature (ART) is the RT_{NDT} adjusted for radiation effects plus a margin term required by Revision 2 of Regulatory Guide 1.99.

input from the secondary system. They also ensure sufficient steam volume exists in the pressurizer to accommodate the insurge. No credit for PORV actuation was assumed in the LTOP analysis of the energy addition transient.

The restrictions apply only to the start of the first RCP. Once at least one RCP is running, equilibrium is achieved between the primary and secondary temperatures, eliminating any significant energy addition associated with the start of the second RCP.

The LTOP restrictions are based on RCS cold leg temperature. This temperature will be determined by using RCS cold leg temperature indication when RCPs are running, or natural circulation if it is occurring. Otherwise, SDC return temperature indication will be used.

Restrictions on RCS makeup pumping capacity are included in Technical Specification 3.4.9.3. These restrictions are based on balancing the requirements for LTOP and shutdown risk. For shutdown risk reduction, it is desirable to have maximum makeup capacity and to maintain the RCS full (not vented). However, for LTOP it is desirable to minimize makeup capacity and vent the RCS. To satisfy these competing requirements, makeup pumps can be made not capable of injecting, but available at short notice.

A charging pump can be considered to be not capable of injecting into the RCS by use of any of the following methods and the appropriate administrative controls.

1. Placing the motor circuit breaker in the open position.

2. Removing the charging pump motor overload heaters from the charging pump circuit.

3. Removing the charging pump motor controller from the motor control center.

A HPSI pump can be considered to be not capable of injecting into the RCS by use of any of the following methods and the appropriate administrative controls.

1. Racking down the motor circuit breaker from the power supply circuit.

2. Shutting and tagging the discharge valve with the key lock on the control panel (2-SI-654 or 2-SI-656).

3. Placing the pump control switch in the pull-to-lock position and removing the breaker control power fuses.

4. Placing the pump control switch in the pull-to-lock position and shutting the discharge valve with the key lock on the control panel (2-SI-654 or 2-SI-656).

These methods to prevent charging pumps and HPSI pumps from injecting into the RCS, when combined with the appropriate administrative controls, meet the requirement for two independent means to prevent pump injection as a result of a single failure or inadvertent single action.

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These methods prevent inadvertent pump injections while allowing manual actions to rapidly restore the makeup capability if conditions require the use of additional charging or HPSI pumps for makeup in the event of a loss of RCS inventory or reduction in SHUTDOWN MARGIN.

If a loss of RCS inventory or reduction in SHUTDOWN MARGIN event occurs, the appropriate response will be to correct the situation by starting RCS makeup pumps. If the loss of inventory or SHUTDOWN MARGIN is significant, this may necessitate the use of additional RCS makeup pumps that are being maintained not capable of injecting into the RCS in accordance with Technical Specification 3.4.9.3. The use of these additional pumps to restore RCS inventory or SHUTDOWN MARGIN will require entry into the associated ACTION statement. The ACTION statement requires immediate action to comply with the specification. The restoration of RCS inventory or SHUTDOWN MARGIN can be considered to be part of the immediate action to restore the additional RCS makeup pumps to a not capable of injecting status. While recovering RCS inventory or SHUTDOWN MARGIN, RCS pressure will be maintained below the Appendix G limits. After RCS inventory or SHUTDOWN MARGIN has been restored, the additional pumps should be immediately made not capable of injecting and the ACTION statement exited.

An exception to Technical Specification 3.0.4 is specified for Technical Specification 3.4.9.3 to allow a plant cooldown to MODE 5 if one or both PORVs are inoperable. MODE 5 conditions may be necessary to repair the PORV(s).

3/4.4.10 DELETED