



Nebraska Public Power District

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KSD920528
July 28, 1992

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

Gentlemen:

Subject: Proposed Change No. 109 to Technical Specifications
Revision of Pressure - Temperature Limitation Curves
Cooper Nuclear Station, NRC Docket No. 50-298, DPR-46

In accordance with the applicable provisions specified in 10 CFR 50, the Nebraska Public Power District (District) requests that the Cooper Nuclear Station (CNS) Technical Specifications be revised as specified in the attachment. The proposed changes validate the existing pressure vs. temperature operating limit curves for CNS beyond the current 12 Effective Full Power Years (EFPY), and remove the vessel material surveillance capsule withdrawal schedule from the CNS Technical Specifications in accordance with the guidance in Generic Letter 91-01. The District currently estimates that CNS will surpass 12 EFPY by early November, 1992; Therefore, new pressure vs. temperature operating limit curves must be in place by that time.

Accordingly, the attached contains a description of the proposed change, the attendant 10 CFR 50.92 evaluation, and the CNS Technical Specification pages revised by the institution of this change. This proposed change has been reviewed by the necessary Safety Review Committees and incorporates all amendments to the CNS Facility Operating License through Amendment 152 issued March 11, 1992.

By copy of this letter and attachment, the appropriate State of Nebraska official is being notified in accordance with 10 CFR 50.91(b)(1). Copies to the NRC Region IV Office and the CNS Resident Inspector are also being sent in accordance with 10 CFR 50.4(b)(2).

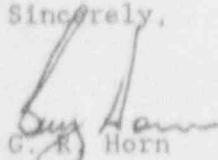
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Should you have any questions or require any additional information, please contact me.

Sincerely,



G. R. Horn
Nuclear Power Group Manager

GRH/MJB

Attachment

cc: H.R. Borchert
Department of Health
State of Nebraska

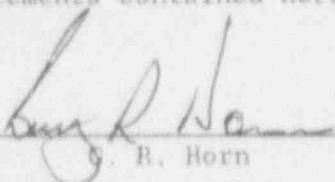
NRC Regional Administrator
Region IV
Arlington, TX

NRC Resident Inspector
Cooper Nuclear Station

U. S. Nuclear Regulatory Commission
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STATE OF NEBRASKA)
)
PLATTE COUNTY)

G. R. Horn, being first duly sworn, deposes and says that he is an authorized representative of the Nebraska Public Power District, a public corporation and political subdivision of the State of Nebraska; that he is duly authorized to submit this request on behalf of Nebraska Public Power District; and that the statements contained herein are true to the best of his knowledge and belief.



G. R. Horn

Subscribed in my presence and sworn to before me this 28th day of
July, 1992.



NOTARY PUBLIC



PROPOSED CHANGE NO. 109
TO THE
CNS TECHNICAL SPECIFICATIONS
REVISION OF PRESSURE VS. TEMPERATURE
OPERATION LIMITATION CURVES

Revised Pages

132
133
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I. INTRODUCTION

The Nebraska Public Power District (District) requests that the NRC approve the proposed changes to the Cooper Nuclear Station (CNS) Technical Specifications described below. The proposed changes validate the existing pressure-temperature operating limit curves (PT curves) for CNS beyond the current 12 Effective Full Power Years (EFPY), and remove the vessel material surveillance capsule withdrawal schedule from the CNS Technical Specifications in accordance with the guidance in Generic Letter 91-01. The District currently estimates that CNS will surpass 12 EFPY by early November, 1992; therefore, new PT curves must be in place by that time.

II. BACKGROUND

Section 3.6.A of the CNS Technical Specifications, "Thermal and Pressurization Limits," defines, through Figure Nos. 3.6.1.a, 3.6.1.b, and 3.6.2, the pressure and temperature boundaries within which CNS must be operated to ensure adequate margin exists against vessel brittle fracture. The current PT curves were developed based on the results from testing the first vessel material surveillance capsule and in accordance with the guidance of Regulatory Guide 1.99 Revision 1, which was in effect at that time.

The first surveillance capsule was removed during the Reload 9, Cycle 10 refueling outage in 1985, and was irradiated an equivalent of approximately 6.8 Effective Full Power Years (EFPY). The surveillance capsule was sent to GE's Vallecitos Nuclear Center for testing and

analysis. Following this testing and analysis, the District submitted Proposed Change No. 48 to the CNS Technical Specifications to revise the vessel PT curves to reflect the surveillance specimen test results.¹ The PT curves were based on the Regulatory Guide 1.99 Revision 1 prediction methods; however, the Regulatory Guide 1.99 Revision 1 results were adjusted to account for the high transition temperature shift measured during testing of the surveillance specimens. This was accomplished by multiplying the Regulatory Guide 1.99 chemistry factor by the ratio of measured shift in RT_{NDT} to that calculated by using the formula in Regulatory Guide 1.99 Revision 1. The result was an adjusted reference temperature (ART - initial RT_{NDT} plus shift) which was more conservative than the values resulting from Regulatory Guide 1.99 Revision 2. Following several related communications, the NRC issued Amendment No. 120 to the CNS operating license to incorporate the new PT curves.²

The NRC noted during their safety evaluation accompanying Amendment No. 120 that the original CNS surveillance program was based on the initial assumptions that the increase in reference temperature at end of life resulting from neutron exposure would be less than 100°F and that the surveillance specimen exposure would be greater than the vessel wall. However, analysis of the first surveillance capsule indicated that the surveillance specimen fluence lags that of the vessel wall, and that the increase in reference temperature would be greater than 100°F at end of life. ASTM E-185-82 recommends that the surveillance capsule lead factors (the ratio of the instantaneous neutron flux density at the specimen location to the maximum calculated neutron flux density at the inside surface of the reactor vessel wall) be in the range of one to three. ASTM E-185-82 also recommends a minimum number of four surveillance capsules to be included in the surveillance program for a predicted end of life transition temperature shift between 100°F and 200°F, with withdrawal schedules of three, six, and fifteen EFPY for the first three capsules, with the last capsule to be removed at end of life.

Based on the above, the NRC recommended that to meet as closely as possible the intent of ASTM E-185-82, that the withdrawal schedule for the second capsule be accelerated to 12 EFPY, and the schedule for the third capsule be determined based on the analysis of the second capsule. The NRC also recommended that the District consider possible insertion of a fourth capsule into the CNS vessel, possibly with reconstituted specimens from an earlier capsule. Following various communications, in 1991, the District committed to: 1) remove the second surveillance capsule during

¹ Letter from L. G. Kuncl (NPPD) to NRC dated October 28, 1987, "Proposed Change No. 48 to the Cooper Nuclear Station Technical Specifications."

² Letter from W. O. Long (NRC) to G. A. Travers (NPPD) dated April 26, 1988, "Cooper Nuclear Station - Amendment No. 120 to Facility Operating License No. DPR-46 (TAG No. 65793)."

the Reload 14, Cycle 15 refueling outage during 1991 (following approximately 11 EFPY of operation), and 2) reconstitute the specimens from this capsule and re-insert the reconstituted specimens during the Reload 15, Cycle 16 refueling outage.³ The District also indicated that the withdrawal schedule for the third capsule will be based on the results of testing the second surveillance capsule.

The second surveillance capsule was withdrawn during the Reload 14, Cycle 15 refueling outage in late 1991 and was shipped to the GE Vallecitos Nuclear Center where it is currently undergoing testing and analysis. However, because the results of this testing will not be available with sufficient lead time to revise the CNS PT curves in order to support continued operation, the District has reanalyzed the CNS PT curves in accordance with the guidance of Regulatory Guide 1.99, Revision 2 and has determined, as discussed below, that the existing CNS PT curves are valid beyond the stated 12 EFPY.

The District will re-evaluate the CNS PT curves upon conclusion of the testing and analysis of the second surveillance capsule, and propose appropriate changes to the surveillance capsule withdrawal schedule and to the CNS Technical Specifications if warranted.

III. DISCUSSION

Regulatory Guide 1.99 Revision 2 provides a method acceptable to the NRC for predicting the effect of neutron radiation on reactor vessel materials as required by Paragraph V.A. of 10 CFR 50 Appendix G. Because of the scatter inherent to Charpy test data, Regulatory Guide 1.99 Revision 2 requires at least two credible surveillance data sets be available before using the reactor-specific data to determine ART and the Charpy upper-shelf energy of reactor beltline materials.⁴ As discussed above, the District currently has only one set of surveillance data available. Therefore, the District generated new ART predictions using the methods described in Regulatory Guide 1.99 Revision 2, using the CNS beltline material chemistries, and the peak fluence at given EFPYs.

The CNS Technical Specifications contain three PT curves for operator use based on the corresponding application. Figure 3.6.1.A provides the minimum vessel temperature vs. vessel pressure for non-nuclear heatup and

³ Letter from G. R. Horn (NPPD) to NRC dated June 7, 1991, "Response to Questions on License Extension to 40 Years from Operating License Issuance." (Note: this letter was erroneously dated 1990)

⁴ Regulatory Guide 1.99 defines "credible" surveillance data as a standard deviation of no more than 28° F for welds and 17° F for base metal about a best fit line fitted as described in Regulatory Position 2.1 of Regulatory Guide 1.99 Revision 2.

for core cooldown following nuclear shutdown, and is valid through 12 EFPY. Figure 3.6.1.b provides the minimum vessel temperature vs. vessel pressure for core operation (when the core is critical), and is also valid through 12 EFPY. Figure 3.6.2 provides the minimum vessel temperature vs. vessel pressure for pressure tests such as that required by Section XI of the ASME code; this figure provides three curves based on 8, 10, and 12 EFPY. Three curves were generated for Figure 3.6.2 to provide greater operational flexibility while performing system pressure tests, depending upon vessel exposure. Each of these curves are based on a calculated ART for the limiting vessel material for the given EFPY based on the application.

Therefore, new ART calculations were performed using the Regulatory Guide 1.99 Revision 2 methodology to validate the existing PT curves beyond the current 12 EFPY. The results of this analysis are shown in the table below for the each ART previously calculated and upon which the existing PT curves are based.

ADJUSTED REFERENCE TEMPERATURE (ART)	EXISTING CNS TECHNICAL SPECIFICATIONS VESSEL EXPOSURE (EFPY) ^a	REVISED CNS TECHNICAL SPECIFICATIONS VESSEL EXPOSURE (EFPY) ^b
93°F	8	13
102°F	10	18
110°F	12	21

- a. Based on Regulatory Guide 1.99 Revision 1 with surveillance test results adjustment
- b. Based on Regulatory Guide 1.99 Revision 2 with no surveillance test results adjustment

The District has therefore revised Figures 3.6.1.a, 3.6.1.b, and 3.6.2, and the corresponding Bases discussion to extend their validity in accordance with the above table. The specific changes are described below in Section IV, "Description of Changes."

In addition, in accordance with Generic Letter 91-01, the District proposes removal of the vessel material surveillance capsule withdrawal schedule from the CNS Technical Specifications. Generic Letter 91-01 provides the guidance for removal of the surveillance capsule withdrawal schedule as a line-item improvement to the Technical Specifications. In accordance with the guidance provided in Generic Letter 91-01, the District has updated the surveillance capsule withdrawal schedule with Revision 10 to the CNS USAR which was submitted to the NRC prior to July 22, 1992.

The Bases section for thermal and pressurization limitations is revised to reference the location of the surveillance capsule withdrawal schedule in the CNS USAR. Finally, Section 4.6.A of the CNS Technical Specifications is revised to indicate that the surveillance specimens shall be removed and examined to determine changes in their material properties as required by 10 CFR 50 Appendix H. These changes correspond to the guidance provided in Generic Letter 91-01, and are detailed below in Section IV, "Description of Changes."

Finally, this proposed change makes an administrative pagination change to relocate a blank page to the end of the 3/4.6 Bases section. This change is detailed in Section IV below.

IV. DESCRIPTION OF CHANGES

- Page 132 - Section 3.6.A.3 is revised to change the Figure 3.6.2 curve references from 8, 10, & 12 EFPY to 13, 18, & 21 EFPY. In addition, the statement indicating that the ART for the bottom head region is valid to 12 EFPY is deleted, as this curve is actually valid to end-of-life, since the bottom head region is not expected to receive sufficient fluence to exhibit a shift in its reference temperature. Additionally, Section 3.6.A.2 is clarified to specify that the temperature limits for non-nuclear heatup and for core cooldown following nuclear shutdown apply only when the reactor vessel head is tensioned.
- Page 133 - The reactor vessel surveillance capsule withdrawal schedule is deleted. Additionally, language is added to specify that the reactor vessel surveillance specimens will be withdrawn and examined to determine changes in their material properties as required by 10 CFR 50 Appendix H.
- Page 147 - The 3/4.6 Bases section is updated to describe the basis for the revised PT curves. This section is also revised to reference the surveillance capsule withdrawal schedule in Section IV.2.7 of the CNS USAR.
- Page 154 - This previously blank page is revised to become the new Figure 3.6.1.a, "Minimum Temperature for Non-Nuclear Heatup or Core Cooldown Following Nuclear Shutdown." In addition, this figure's period of validity is revised from 12 to 21 EFPY.
- Page 155 - This page, previously Figure 3.6.1.a, is revised to become the new Figure 3.6.1.b, "Minimum Temperature for Core Operation (Criticality) - Includes 40°F Margin Required by 10CFR50 Appendix C." In addition, this figure's period of validity is revised from 12 to 21 EFPY.
- Page 156 - This page, previously Figure 3.6.1.b, is revised to become the new Figure 3.6.2, "Minimum Temperature for Pressure Tests Such as Required by Section XI." In addition, this figure's period

of validity is revised from the indicated 8, 10, & 12 EFPY to 13, 18, & 21 EFPY respectively.

Page 157 - These pages are combined into one "Intentionally Left Blank"
& 158 page.

V. SIGNIFICANT HAZARDS DETERMINATION

10 CFR 50.91(a)(1) requires that licensee requests for operating license amendments be accompanied by an evaluation of significant hazards posed by the issuance of the amendment. This evaluation is to be performed with respect to the criteria given in 10 CFR 50.92(c). The following analysis meets these requirements.

Evaluation of this Amendment with Respect to 10 CFR 50.92

The enclosed Technical Specifications change is judged to involve no significant hazards based on the following:

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

Evaluation

The proposed revisions to the existing Cooper Nuclear Station (CNS) Technical Specifications pressure vs. temperature operating limit curves (PT curves) do not involve a significant increase in the probability or consequences of an accident previously evaluated. The existing PT curves, approved with Amendment No. 120 to the CNS operating license, were developed based on Regulatory Guide 1.99 Revision 1, the NRC guidance in effect at the time of their revision, and were conservatively adjusted to account for the results from testing the initial vessel materials surveillance capsule withdrawn. Since that time, the NRC issued Regulatory Guide 1.99 Revision 2, which describes the current methods acceptable to the NRC for predicting the shift in nil-ductility transition temperature (RT_{NDT}) of the vessel beltline materials. The proposed revisions to the CNS PT curves are based on the recommendations in Regulatory Guide 1.99 Revision 2, and are therefore in accordance with the latest NRC guidance.

In 1985, the District removed the first vessel materials surveillance capsule for testing and analysis. This testing displayed an RT_{NDT} shift greater than had been previously expected. Accordingly, the District revised the CNS PT curves based on the guidance in effect at that time, Regulatory Guide 1.99 Revision 1, but conservatively adjusted the results to account for the RT_{NDT} shift exhibited during the testing of the first surveillance capsule. As a result, the Regulatory Guide 1.99 Revision 1 chemistry factors used to determine the Adjusted Reference Temperature (ART - initial RT_{NDT} plus the shift in RT_{NDT} due to

neutron irradiation) were multiplied by an adjustment factor equal to the ratio of the measured RT_{NDT} at 6.8 Effective Full Power Years (EFPY) to the expected RT_{NDT} at 6.8 EFPY using Regulatory Guide 1.99 Revision 1 methods. This methodology resulted in estimated APT values that were overly conservative, when compared to Regulatory Guide 1.99 Revision 2 predictions.

The proposed changes to the CNS PT curves are based on the methods described in Regulatory Guide 1.99 Revision 2. Because of the data scatter inherent to Charpy testing results, absent additional justification, Regulatory Guide 1.99 Revision 2 requires that at least two sets of credible surveillance data be available to develop a vessel-specific transition temperature shift correlation; otherwise, the methods of Regulatory Guide 1.99 Revision 2 should be used. Currently, the District has only one set of surveillance data available. The second CNS surveillance capsule was removed during the Reload 14, Cycle 15 Refueling outage in the late fall of 1991; however, the results of the second capsule testing will not be available on a schedule that will support this proposed change. The District has therefore recalculated the ART based on the method described in Regulatory Guide 1.99 Revision 2.

The results of these calculations validate the present CNS PT curves through 21 EFPY of operation, which represents an ART of 110°F as calculated using the Regulatory Guide 1.99, Revision 2. These include Figure 3.6.1.a, "Minimum Temperature for Non-Nuclear Heatup or Cooldown Following Nuclear Shutdown, Figure 3.6.1.b, "Minimum Temperature for Core Operation (Criticality) - Includes 40°F Margin Required by 10CFR50 Appendix G," and Figure 3.6.2, "Minimum Temperature for Pressure Tests Such as Required by Section XI." Additionally, the three separate curves are retained in Figure 3.6.2 to provide operational flexibility. These curves correspond to ARTs of 93°F, 102°F, and 110°F which are valid for 13, 18, and 21 EFPY respectively based on Regulatory Guide 1.99 Revision 2 calculations.

Other than the extension of their period of validity by using the calculation methods of Regulatory Guide 1.99 Revision 2, no other changes are proposed to the CNS PT curves. Accordingly, the proposed revision to the CNS PT curves are based on an NRC-accepted means of ensuring protection against brittle reactor vessel failure, and compliance with 10 CFR Appendix G will be maintained. Therefore, this proposed change will not involve a significant increase in the probability or consequences of an accident previously evaluated.

The changes proposed to remove the reactor vessel surveillance capsule withdrawal schedule from the CNS Technical Specifications are in accordance with the guidance provided in Generic Letter 91-01. As discussed in Generic Letter 91-01, licensee vessel surveillance programs are controlled by 10 CFR Appendix H, which requires licensee submittal of and NRC approval of the proposed surveillance capsule withdrawal schedule prior to implementation.

In addition, with Revision 10 to the CNS Updated Safety Analysis Report (USAR), the District will update the surveillance withdrawal schedule as described in the NRC Safety Evaluation accompanying Amendment No. 143 to the CNS Operating License, dated July 5, 1991. Therefore, no loss of NRC regulatory control of the surveillance capsule withdrawal schedule occurs as a result of this proposed change, and removal of the surveillance capsule does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The changes to Section 3.6.A.2 which clarify that the temperature limits apply only when the reactor vessel head is tensioned are consistent with the 1986 ASME code, and are therefore consistent with 10 CFR 50 Appendix G. This is referenced in Section IV.2.6.3.2 of the CNS USAR. Therefore, these clarifications do not involve a significant increase in the probability or consequences of an accident previously evaluated.

Finally, the repagination does not involve a significant increase in the probability or consequences of an accident previously evaluated, as this is a purely administrative change.

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

Evaluation

The proposed changes update existing vessel pressure - temperature operating limits to correspond with the current NRC guidance. These changes are necessary to permit operation beyond 12 EFPY. The proposed changes do not involve any plant design changes nor any new mode of operation. These changes only demonstrate compliance with the brittle fracture prevention requirements of 10 CFR 50 Appendix G, and therefore do not create the possibility for a new or different kind of accident from any accident previously evaluated.

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

Evaluation

The proposed changes to the CNS PT curves do not create a significant reduction in the margin of safety. The proposed changes revise the existing CNS PT curves to be consistent with the recommendations of Regulatory Guide 1.99, Revision 2, the current NRC guidance given to ensure compliance with 10 CFR Appendix G.

As discussed above, the existing CNS PT curves were developed by using the guidance of Regulatory Guide 1.99 Revision 1 with adjustment factors to account for the greater than expected transition temperature shift exhibited during testing of the first set of vessel material surveillance specimens withdrawn in 1985.

This methodology introduced excessive conservatism compared to the results using the methods of Regulatory Guide 1.99 Revision 2.

The proposed revision of the CNS PT curves removes the excessive conservatism contained in the existing PT curves which were developed using guidance which is now outdated. The proposed revision to the PT curves does utilize the most current NRC guidance for compliance with 10 CFR 50 Appendix G. Therefore, this proposed change does not result in a significant reduction in the margin of safety.

The changes to Section 3.6.A.2 to clarify that the vessel temperature limits apply only when the reactor vessel head is tensioned do not involve a significant reduction in the margin of safety. These changes only clarify the requirements of 10 CFR 50 Appendix G, and makes the CNS Technical Specifications consistent with the CNS USAR.

The proposed change to remove the vessel material surveillance capsule withdrawal schedule from the CNS Technical Specifications is in accordance with the guidance contained in Generic Letter 91-01. In addition, 10 CFR 50 Appendix H requires licensees to obtain NRC approval of any changes to the surveillance capsule withdrawal schedule; therefore, including the schedule in the Technical Specifications represents redundant control mechanisms. Further, the District will be updating with Revision 10 to the CNS USAR, the surveillance capsule withdrawal schedule in accordance with commitments made during approval of Amendment No. 143 to the CNS Operating License. Therefore, removal of the surveillance capsule withdrawal schedule does not constitute a reduction in the margin of safety.

VI. CONCLUSION

The District has evaluated the proposed changes described above against the criteria given in 10 CFR 50.92(c) in accordance with the requirements of 10 CFR 50.91(a)(1). This evaluation has determined that this proposed change will not 1) involve a significant increase in the probability or consequences of an accident previously evaluated, 2) create the possibility for a new or different kind of accident from any accident previously evaluated, or 3) create a significant reduction in the margin of safety. Therefore, for the reasons detailed above, the District requests NRC approval of Proposed Change No. 109.