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U-602551
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8E.100
WC-062-96
February 22, 1996

Docket No. 50-461

10CFR50.90

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station Proposed Amendment of
Facility Operating License No. NPF-62 (PS-95-015)

Dear Sir:

Pursuant to 10CFR50.90, Illinois Power (IP) hereby applies for amendment of Facility Operating License No. NPF-62, Appendix A Technical Specifications, for Clinton Power Station (CPS). This request consists of proposed changes to Technical Specification (TS) 3.4.11, "Reactor Coolant System (RCS) Pressure and Temperature (P/T) Limits," to incorporate specific P/T limits for the bottom head region of the reactor vessel, separate and apart from the core beltline region of the reactor vessel.

A description of the proposed changes and associated justification (including a Basis For No Significant Hazards Consideration) are provided in Attachment 2. A marked-up copy of the affected pages from the current TS is provided in Attachment 3. A marked-up copy of the affected pages from the current TS Bases is provided in Attachment 4. Further, an affidavit supporting the facts set forth in this letter and its attachments is provided in Attachment 1. Following NRC approval of this request, IP will revise the CPS TS Bases, in accordance with the TS Bases Control Program of TS 5.5.11, to incorporate the changes identified in Attachment 4.

IP has reviewed the proposed changes against the criteria of 10CFR51.22 for categorical exclusion from environmental impact considerations. The proposed changes do not involve a significant hazards consideration, or significantly increase the amounts or change the types of effluents that may be released offsite, nor do they significantly increase

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individual or cumulative occupational radiation exposures. Based on the foregoing, IP concludes that the proposed changes meet the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.

Sincerely yours,

Wilfred Connell

Wilfred Connell
Vice President

JFK/csm

Attachments

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety

Attachment 1
to U-602551

Wilfred Connell, being first duly sworn, deposes and says: That he is Vice President of Illinois Power; that the application for amendment of Facility Operating License NPF-62 has been prepared under his supervision and direction; that he knows the contents thereof; and that to the best of his knowledge and belief said letter and the facts contained therein are true and correct.

Date: This 22nd day of February 1996.

Signed: Wilfred Connell

Wilfred Connell

STATE OF ILLINOIS } SS.
DeWitt COUNTY }

"OFFICIAL SEAL"
Jacqueline S. Matthias
Notary Public, State of Illinois
My Commission Expires 11/24/97

Subscribed and sworn to before me this 22nd day of February 1996.

Jacqueline S. Matthias

(Notary Public)

Background

The reactor vessel pressure/temperature (P/T) limits of Technical Specification 3.4.11, "Reactor Coolant System (RCS) Pressure and Temperature Limits," are established in accordance with Appendix G of 10CFR50 to provide adequate margins of safety against brittle fracture of the reactor vessel during all conditions of normal operation, including anticipated operational occurrences and system hydrostatic tests, to which the reactor coolant pressure boundary may be subjected over its service lifetime. Part of the analysis involved in developing the P/T limits accounts for irradiation embrittlement effects in the core beltline region of the reactor vessel. Accordingly, Regulatory Guide 1.99, Revision 2 methodology has been used at Clinton Power Station (CPS) to predict the shift in nil-ductility reference temperature (RT_{NDT}) as a function of neutron fluence in the core beltline region.

Operating limits for pressure and temperature are specified on Technical Specification Figure 3.4.11-1, "RCS Pressure Versus Minimum Reactor Vessel Metal Temperature," and are required for three categories of operation: (a) hydrostatic pressure tests and leak tests (referred to as Curve A), (b) non-nuclear heatup/cooldown and low level physics tests (referred to as Curve B), and (c) core critical operation (referred to as Curve C). This amendment request only affects the limits applicable to hydrostatic pressure tests and leak tests (i.e., Curve A).

For each of the three categories of operation, there are three reactor vessel regions that are considered with respect to P/T limits: the closure flange region, the core beltline region, and the remainder of the reactor vessel (or non-beltline regions). The P/T limits are established as a composite of the most limiting of these regions. The closure flange region limits are controlling at lower pressures primarily because of 10CFR50 Appendix G requirements. The beltline and non-beltline region limits are evaluated according to the procedures in 10CFR50, Appendix G; ASME Section III, Appendix G (1986 Edition with 1988 Addenda); and Welding Research Council (WRC) Bulletin 175, with the beltline region minimum temperature limits adjusted to account for vessel irradiation.

The vessel bottom head does not share the proximity to the active core as the beltline region, and as such will not experience the same shift in nil-ductility reference temperature. It is this phenomenon of lower total irradiation over the lifetime of the vessel which allows the bottom head to be considered separately for performing fracture analyses and specifying applicable vessel P/T limits. It is desirable to establish a separate P/T limit curve for the bottom head since it is typically at a lower temperature than the beltline regions during leak and hydrostatic pressure testing. The temperature difference is created by the absence (or low level) of recirculation loop flow and cooler water being injected through the control rod drives for the purpose of vessel pressurization.

This Technical Specification amendment request is being submitted to the NRC for approval to include specific P/T limits for the bottom head of the reactor vessel in the CPS Technical Specifications, separate and apart from the reactor vessel beltline limits.

Description of Proposed Changes

In accordance with 10CFR50.90, Technical Specification 3.4.11 is being revised to include specific P/T limits for the bottom head of the reactor vessel as part of Curve A in associated Figure 3.4.11-1. The P/T limits for the remainder of the vessel will not be affected by this revision.

The proposed TS changes are reflected on a marked-up copy of the affected pages from the CPS TS in Attachment 3. In addition, changes to the CPS TS Bases, consistent with the proposed TS changes, are provided in Attachment 4.

Justification for Proposed Change

Appendix G to 10CFR50 requires P/T operating limits to be developed to provide adequate margins of safety against brittle fracture of the reactor vessel during all conditions of normal operation to which the reactor pressure boundary may be subjected over its lifetime. As noted previously, there are three reactor vessel regions that are considered with respect to P/T limits: the closure flange region, the core beltline region, and the remainder of the reactor vessel (or non-beltline regions). Although this amendment request is primarily concerned with the P/T limits that apply to reactor pressure vessel leak testing (Curve A), the methodology or basis for developing the P/T limits applies to all three aforementioned categories of operation and therefore to all three curves (A, B, and C) appearing on Technical Specification Figure 3.4.11-1. The basis for the P/T limits for each of the three reactor vessel regions is summarized below.

Closure Flange Region

Appendix G to 10CFR50 sets several minimum requirements for pressure and temperature, in addition to those outlined in the ASME Code, based on the closure flange region RT_{NDT}. In some cases, the limits developed as a result of analyses for other regions exceed these requirements and the closure flange region requirements do not affect the shape of the P/T limit curves. However, some closure flange region requirements do impact the P/T limit curves, particularly the lower parts of the curves. In addition, GE recommends maintaining a 60°F margin on the required bolt preload temperature, as further described below.

As stated in Paragraph G-2222(c) of ASME Section III, Appendix G, for application of full bolt preload and reactor pressures up to 20% of the hydrostatic test pressure, the reactor vessel metal temperature must be at RT_{NDT} or greater. The GE practice is to require RT_{NDT} + 60°F for bolt preload, for two reasons:

a. The ASME Code prior to 1972 required RT_{NDT} + 60°F, and

b. The highest stressed region during boltup is the closure flange region, and the flaw size assumed in that region (0.24 inches) is less than 1/4 T. This flaw size is detectable using ultrasonic testing (UT) techniques. In fact, studies report that a flaw in the closure flange region of 0.09 inch can be reliably detected using UT.

For CPS, the closure flange and attached shell limits of RT_{NDT} + 60°F (i.e., 70°F) are consistent with the lowest allowable service temperature for the bolting material.

10CFR50 Appendix G, paragraph IV.A.2, sets minimum temperature requirements for pressures above 20% of the hydrostatic pressure based on the RT_{NDT} of the closure flange region. Appendix G to 10CFR50 states that the Curve A temperature limit must be no less than RT_{NDT} + 90°F (i.e., 100°F). This requirement causes the step in the curve at 20% of the hydrostatic test pressure (312 psig) shown in Figure 3.4.11-1.

The proposed change to Technical Specification Figure 3.4.11-1 (the addition of P/T limits for the bottom head to Curve A) does not affect the part of the P/T limit curves governed by the closure flange region.

Core Beltline Region

The P/T limits for the core beltline region were determined according to the methods of Appendix G to the ASME Code. The core beltline limits primarily affect the higher pressure portions of the P/T limit curves. These curves shift over plant life due to embrittlement as the integrated beltline neutron fluence increases over time. Typically, the beltline curves shift to become more limiting than the non-beltline curves at some point during the reactor vessel operating life. Using Regulatory Guide 1.99, Revision 2 methodology, this occurred for CPS after 2.7 EFPY of operation. Projecting forward, for the "A" baseline curve, this shift will result in hydrostatic vessel pressure tests being required to be performed at temperatures greater than 200°F after 12 EFPY using Regulatory Guide 1.99, Revision 2 methodology. However, the P/T limit curves must be revised following withdrawal of the first surveillance capsule after 10 EFPY. Thus, although Figure

3.4.11-1 currently reflects the P/T limits for operation up to 12 EFPY, the figure must be revised prior to exceeding 12 EFPY to provide P/T limits for operation from 12 EFPY to end of life (32 EFPY).

The proposed incorporation of additional bottom head P/T limits to Curve A of Technical Specification Figure 3.4.11-1 will have no effect on the existing curves (for various EFPY) contained in Curve A for the core beltline or flange regions of the reactor vessel. The proposed bottom head portion of Curve A is separate from the existing curves of Curve A at higher pressures. Since the bottom head is not subjected to high neutron fluence the separate portion of the bottom head curve is not predicted to shift. Accordingly, the non-beltline region is most applicable to the bottom head curve as further discussed below.

Non-Beltline Regions

As mentioned earlier, the beltline and non-beltline region limits are evaluated according to the procedures in 10CFR50, Appendix G, ASME Section III, Appendix G (1986 Edition with 1988 Addenda), and Welding Research Council (WRC) Bulletin 175, with the beltline region minimum temperature limits adjusted to account for vessel irradiation. Non-beltline regions are those locations that receive insufficient neutron fluence to cause any RT_{NDT} increase. Non-beltline components include the nozzles, the closure flanges, some shell plates, top and bottom head plates, and the control rod drive (CRD) penetrations. Detailed stress analyses of the non-beltline components (specifically for the purpose of fracture toughness analysis) were performed generically for the BWR/6. The analyses took into account all mechanical loadings and thermal transients anticipated. Detailed stresses were used to develop plots of allowable pressures versus temperature relative to the reference temperature ($T - RT_{NDT}$). Curves were developed for the two most limiting regions: the feedwater nozzle regions and the CRD penetration regions. All other non-beltline regions, including the bottom head region, were categorized under one of these two regions.

The generic BWR/6 non-beltline region results were applied to CPS by adding the highest RT_{NDT} for the non-beltline discontinuities to the appropriate pressure versus temperature ($T - RT_{NDT}$) curve for the BWR/6 CRD penetration regions or feedwater nozzle regions.

Currently, the beltline curves are limiting for vessel pressure test conditions. Since the reactor pressure vessel bottom head does not experience the same embrittling effects of the high neutron fluence associated with the beltline region, it is appropriate to apply the limits calculated for the non-beltline regions to the bottom head region.

During leak and hydrostatic pressure testing, the bottom head temperature may be cooler than the higher elevations of the vessel if the recirculation pumps are either stopped or operating at low speed and injection through the control rod drives is used to pressurize the vessel. Monitoring the reactor pressure vessel bottom head temperature separately from the beltline region will reduce the required pressure test temperature for this localized region. This proposed Technical Specification amendment would allow the reactor pressure vessel bottom head temperature to be monitored separately from the rest of the vessel in lieu of the current requirement that all vessel temperatures be above the most limiting condition on the P/T limit curves. It must be noted again that this amendment does not change any of the existing P/T limit curves other than to allow for separate temperature monitoring of the bottom head region during vessel pressure test conditions.

Basis For No Significant Hazards Consideration

According to 10CFR50.92, a proposed change to the license (Technical Specifications) involves no significant hazards consideration if operation of the facility in accordance with the proposed change would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated, or (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety. The proposed changes are evaluated against each of these criteria below.

1) The proposed change results in a specific pressure and temperature (P/T) limit curve for the bottom head during vessel pressure testing evolutions, while the P/T limits for the remaining balance of reactor pressure vessel regions are unchanged. The limits for the bottom head region, which are only applicable during vessel system pressure or leak testing, were developed consistent with Regulatory Guide 1.99, Revision 2; 10CFR50, Appendix G; ASME Section III, Appendix G; and Welding Research Council (WRC) Bulletin 175. Additionally, the proposed change does not result in a change to the way in which the hydrostatic pressure tests are performed. That is, conformance to the P/T limits specified in Technical Specification Figure 3.4.11-1 with the proposed bottom head P/T limits incorporated, will continue to provide protection against brittle fracture of the vessel system during required testing so that vessel integrity is maintained. Therefore, this proposed change does not result in an increase in the probability or consequences of any accident previously evaluated.

2) The proposed change does not result in any change to the plant or the way in which the hydrostatic pressure tests are performed. As a result, no new failure modes are introduced. Therefore, the proposed change cannot create the possibility of a new or different kind of accident from any accident previously evaluated.

3) The new P/T limit curve for the bottom head has been developed consistent with Regulatory Guide 1.99, Revision 2; 10CFR50, Appendix G; ASME Section III, Appendix G; and Welding Research Council (WRC) Bulletin 175. All other regions of the reactor pressure vessel retain their applicability to appropriate and previously approved P/T limit curves which are based on the same methodology. Conformance to the P/T limit curves, with the proposed changes incorporated, will continue to provide adequate margins of safety against brittle fracture of the reactor vessel. Therefore, this proposed change does not result in a significant reduction in the margin of safety.

Based upon the foregoing, IP concludes that this proposed change does not involve a significant hazards consideration.

Attached Marked-Up
Pages of the Technical Specifications