

"[p]roposed alternatives to the requirements in [Appendix G] of this part or portions thereof may be used when an exemption is granted by the Commission under [10 CFR 50.12]."

In the licensee's October 8, 2002, license amendment request to implement a pressure-temperature limits report (PTLR) for FCS, the licensee identified Topical Report Combustion Engineering (CE) NPSD-683-A, Revision 6, as part of the PTLR methodology that would be cited in the FCS Technical Specifications (TS). The NRC staff approved CE NPSD-683-A, Revision 6, by letter dated March 16, 2001, with specified limitations or additional licensee actions which are necessary to support a licensee's adoption of CE NPSD-683-A, Revision 6. One of the specified licensing actions stated that if a licensee proposed to utilize the methodology in CE NPSD-683-A, Revision 6, for the calculation of flaw stress intensity factors due to thermal stress loadings (K_{It}), an exemption was required since the methodology for the calculation of K_{It} values in CE NPSD-683-A, Revision 6, could not be shown to be conservative with respect to the methodology for the determination of K_{It} provided in Editions and Addenda of ASME Code, Section XI, Appendix G, through the 1995 Edition and 1996 Addenda (the latest Edition and Addenda of the ASME Code which had been incorporated into 10 CFR 50.55a at the time of the staff's review of CE NPSD-683-A, Revision 6). Therefore, in conjunction with the licensee's October 8, 2002, license amendment request, the licensee also submitted an exemption request, consistent with the requirements of 10 CFR 50.60, to apply the K_{It} calculational methodology of CE NPSD-683-A, Revision 6, as part of the FCS PTLR methodology.

During the NRC staff's review of CE NPSD-683-A, Revision 6, the staff evaluated the K_{It} calculational methodology of CE NPSD-683-A, Revision 6, versus the methodologies for K_{It} calculation given in Appendix G to Section XI of the ASME Code. In the staff's March 16, 2001, safety evaluation (SE), the staff noted, "[i]n the [CE methodology], the K_{It} is calculated using thermal [stress] influence coefficients developed from 2-dimensional (2-D) FEM [finite element] models with linear, quadratic, and cubic vessel temperature profiles. These thermal influence coefficients are then corrected for the 3-D elliptical crack geometry using the procedures of Appendix A to Section XI of the ASME Code. Theoretically, using CE's thermal influence coefficients is equivalent to

using the [thermal] stress influence coefficients of the current [1995 Edition through 1996 Addenda] Appendix G methodology.... Thus, the alternative methodology in [the CE NPSD-683-A, Revision 6] for calculating K_{It} factors is similar to that in the most recent edition of Appendix G to the Code endorsed by Mr. J. A. Keeney and Mr. T. L. Dickson of Oak Ridge National Laboratory has demonstrated that a 3-dimensional FEM approach gives thermal influence coefficients that are very similar to those incorporated in the CE NPSD-683-A, Revision 6, methodology. In summary, the staff concluded in its March 16, 2001, SE that the methodology in CE NPSD-683-A, Revision 6, including that for the calculation of K_{It} , would lead to the development of P-T limit curves which are only slightly non-conservative with respect to those which would be calculated using the 1989 Edition of Appendix G to Section XI of the ASME Code (the Edition of record for FCS). The staff stated in the SE that P-T limit curves developed using the methodology of CE NPSD-683-A, Revision 6, are adequate to protect the RPV against brittle fracture under all normal operating and hydrostatic/leak test conditions and licensees applying for PTLRs could apply the methods of CE NPSD-683-A, Revision 6, to the P-T limit calculations provided an exemption to use the methodology would be reviewed and granted by the staff in accordance with the provisions of 10 CFR 50.60(b).

3.0 Discussion

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 50 when (1) The exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present.

Special circumstances, pursuant to 10 CFR 50.12(a)(2)(ii), are present in that continued operation of FCS with P-T limit curves developed in accordance with ASME Section XI, Appendix G without the relief provided by utilizing the K_{It} calculational methodology of CE NPSD-683-A, Revision 6, is not necessary to achieve the underlying purpose of Appendix G to 10 CFR part 50. Application of the K_{It} calculational methodology of CE NPSD-683-A, Revision 6, in lieu of the calculational methodology specified in ASME Code Section XI, Appendix G, provides an acceptable alternative evaluational

procedure which will continue to meet the underlying purpose of appendix G to 10 CFR part 50. The underlying purpose of the regulations in appendix G to 10 CFR part 50 is to provide an acceptable margin of safety against brittle failure of the RCS during any condition of normal operation to which the pressure boundary may be subjected over its service lifetime.

Based on the staff's March 16, 2001, SE regarding CE NPSD-683-A, Revision 6, and the licensee's exemption request, the staff accepts the licensee's determination that an exemption would be required to approve the use of the K_{It} calculational methodology of CE NPSD-683-A, Revision 6. The staff concludes that the application by FCS of the technical provisions of the K_{It} calculational methodology of CE NPSD-683-A, Revision 6, provide sufficient margin in the development of RPV P-T limit curves such that the underlying purpose of the regulations (appendix G to 10 CFR part 50) continues to be met. Therefore, the NRC staff concludes that the exemption requested by the licensee meets the special circumstances of 10 CFR 50(a)(2)(ii), "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule," and is therefore justified and may be granted.

4.0 Conclusion

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants Omaha Public Power District an exemption from the requirements of 10 CFR part 50, appendix G, to allow application of the K_{It} calculational methodology of CE NPSD-683-A, Revision 6, in establishing PTLR methodology for FCS.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (68 FR 44110).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 30th day of July 2003.

For The Nuclear Regulatory Commission.

Ledyard B. Marsh,

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