

July 30, 2003

Mr. R. T. Ridenoure
Division Manager - Nuclear Operations
Omaha Public Power District
Fort Calhoun Station, FC-2-4 Adm.
P.O. Box 550
Fort Calhoun, NE 68023-0550

SUBJECT: FORT CALHOUN STATION, UNIT 1 – EXEMPTION FROM THE
REQUIREMENTS OF APPENDIX G TO 10 CFR PART 50 (TAC NO. MB8237)

Dear Mr. Ridenoure:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix G, for the Fort Calhoun Station, Unit 1. This action is in response to your letter of October 8, 2002, that requested use of the methodology for the calculation of K_{it} values in Combustion Engineering Topical Report NPSD-683-A, Revision 6.

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Alan B. Wang, Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosure: Exemption

cc w/enclosure: See next page

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
OMAHA PUBLIC POWER DISTRICT
FORT CALHOUN STATION, UNIT 1
DOCKET NO. 50-285
EXEMPTION

1.0 BACKGROUND

The Omaha Public Power District (the licensee) is the holder of Facility Operating License No. DPR-40 which authorizes operation of the Fort Calhoun Station, Unit 1 (FCS). The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the U.S. Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of a pressurized water reactor located in Washington County in Nebraska.

2.0 REQUEST/ACTION

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix G, which is invoked by 10 CFR 50.60, requires that pressure-temperature (P-T) limits be established for reactor pressure vessels (RPVs) during normal operating and hydrostatic or leak rate testing conditions. Specifically, Appendix G to 10 CFR Part 50 states that "[t]he appropriate requirements on...the pressure-temperature limits and minimum permissible temperature must be met for all conditions," and "[t]he pressure-temperature limits identified as 'ASME [American Society for Mechanical Engineers] Appendix G limits'...require that the limits must be at least as conservative as limits obtained by following the methods of analysis and the margins of safety

of Appendix G of Section XI of the ASME [Boiler and Pressure Vessel] Code." Appendix G of 10 CFR Part 50 also specifies that the Editions and Addenda of the ASME Code which are incorporated by reference in 10 CFR 50.55a apply to the requirements in Appendix G to 10 CFR Part 50. In the 2003 Edition of the Code of Federal Regulations, the NRC endorsed Editions and Addenda of the ASME Code through the 1998 Edition and 2000 Addenda. However, the licensee has currently incorporated the 1989 Edition of the ASME Code into the FCS licensing basis for defining the ASME Code requirements which apply to the plant's ASME Code, Section XI program. Hence, with respect to the statements from Appendix G to 10 CFR Part 50 referenced above, it is the 1989 Edition of ASME Code, Section XI, Appendix G, which continues to apply for FCS. Finally, 10 CFR 50.60(b) states that, "[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 the NRC." In addition, work done 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

/RA/

Ledyard B. Marsh, Director
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

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