

vapor hazards would continue to be a safety concern for personnel conducting inspections in the primary containment. Implementation of the proposed P/T curves, as allowed by ASME Code Case N-640, would not significantly reduce the margin of safety and would eliminate steam vapor hazards by allowing inspections in the primary containment to be conducted at a lower coolant temperature.

3.0 Discussion

Pursuant to 10 CFR part 50, Section 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. These special circumstances include the following:

(1) Pursuant to 10 CFR part 50, Section 50.12(a)(2)(ii), the circumstance that application 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. ASME Code, Section XI, Appendix G, provides procedures for determining the allowable loading on the RPV and is approved for that purpose by 10 CFR part 50, Appendix G. Application of these procedures in the determination of P/T operating and test curves satisfies the underlying requirement that (1) the reactor coolant pressure boundary be operated in a regime having a sufficient margin to ensure, when stressed, the vessel boundary behaves in a ductile manner and the probability of a rapidly propagating fracture is minimized; and (2) P/T operating and test limit curves provide an adequate margin in consideration of uncertainties in determining the effects of irradiation on material properties. The ASME Code, Section XI, Appendix G, procedure was conservatively developed based upon the level of knowledge existing in 1974 concerning RPV materials and the estimated effects of operation. Since 1974, the level of knowledge concerning these topics has greatly expanded. This increased knowledge permits relaxation of the ASME Code, Section XI, Appendix G, requirements via application of ASME Code Case N-640, while maintaining the underlying purpose of the ASME Code and NRC regulations to ensure an acceptable margin of safety.

(2) Pursuant to 10 CFR part 50, Section 50.12(a)(2)(iii), compliance

would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or those incurred by others similarly situated. The P/T operating window from the RCS is defined by the P/T operating and test limit curves developed in accordance with the ASME Code, Section XI, Appendix G procedure. As previously noted, continued operation of MNGP with these P/T curves without the relief provided by ASME Code Case N-640 would unnecessarily restrict the P/T operating window. This restriction requires the MNGP Operations Staff to maintain a high temperature during pressure tests and also subjects the inspection personnel to increased safety hazards while conducting inspections of systems with the potential for steam leaks in a primary containment at elevated temperatures.

This constitutes an unnecessary burden that can be alleviated by the application of ASME Code Case N-640 in the development of the proposed P/T limit curves. Implementation of the proposed P/T limit curves, as allowed by ASME Code Case N-640, would not significantly reduce the margin of safety.

(3) Pursuant to 10 CFR part 50, Section 50.12(a)(2)(v), compliance will provide "only temporary relief from the applicable regulation and the licensee . . . has made good faith efforts to comply with the regulation." The NRC staff finds that the licensee for MNGP has made a good faith effort to comply with the regulation, and the requested exemption provides only temporary relief from the applicable regulation until such time that the NRC generically approves ASME Code Case N-640 for use by the nuclear industry.

The NRC staff examined the licensee's rationale to support the exemption request and concluded that the use of the ASME Code Case N-640 would satisfy 10 CFR part 50, Section 50.12(a)(1) as follows:

(1) The requested exemption is authorized by law: No law exists which precludes the activities covered by this exemption request. The regulation 10 CFR part 50, Section 50.60(b), allows the use of alternatives to 10 CFR part 50, Appendices G and H, when an exemption is granted by the Commission pursuant to 10 CFR part 50, Section 50.12.

(2) The requested exemption does not present an undue risk to the public health and safety: ASME Code Case N-640 permits the use of alternate reference fracture toughness (K_{IC} fracture toughness curve instead of K_{IA} fracture toughness curve) for RPV

Materials in determining the P/T limits. The K_{IC} fracture toughness curve is shown in ASME Code, Section XI, Appendix A, Figure A-2200-1, and provides greater allowable fracture toughness than the corresponding K_{IA} fracture toughness curve of ASME Code, Section XI, Appendix G, Figure G-2210-1. The other margins involved with the ASME Code, Section XI, Appendix G process of determining P/T limit curves remain unchanged.

Use of the K_{IC} curve in determining the lower bound fracture toughness in the development of the P/T operating limits curve is more technically correct than the K_{IA} curve. The K_{IC} curve models the slow heatup and cooldown process of a reactor vessel. The K_{IC} curve appropriately implements the use of static initiation fracture toughness behavior to evaluate the controlled heatup and cooldown process of a RPV.

Use of this approach is justified by the initial conservatism of the K_{IA} curve when the curve was codified in 1974. This initial conservatism was necessary due to limited knowledge of RPV material fracture toughness. Since 1974, additional knowledge has been gained about the fracture toughness of vessel materials and their fracture response to applied loads. The additional knowledge demonstrates that the lower bound fracture toughness provided by the K_{IA} curve is well beyond the margin of safety required to protect against potential RPV failure. The lower bound K_{IC} fracture toughness provides an adequate margin of safety to protect against potential RPV failure and does not present an undue risk to public health and safety.

P/T limit curves based on the K_{IC} fracture toughness limits will enhance overall plant safety by opening the P/T operating window. Since the RCS P/T operating window is defined by the P/T operating and test limit curves developed in accordance with the ASME Code, Section XI, Appendix G, procedure, continued operation of MNGP with these P/T limit curves without using ASME Code Case N-640 would unnecessarily require the RPV to be maintained at a temperature exceeding 212 °F in a limited operating window during the pressure test. Consequently, steam vapor hazards would continue to be one of the safety concerns for personnel conducting inspections in the primary containment.

Use of the revised curves would result in a reduction in the challenges to operators in maintaining a high temperature in a limited operating window and would eliminate steam vapor hazards by allowing inspections in primary containment to be conducted