Xcel Energy®

Monticello Nuclear Generating Plant
2807 W County Road 75
Monticello, MN 55362

December 7, 2012

L-MT-12-100
10 CFR 50.90

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Monticello Nuclear Generating Plant
Docket 50-263
Renewed Facility Operating License No. DPR-22

Response to a Request for Additional Information: License Amendment Request: Revise and Relocate Pressure Temperature Curves to a Pressure Temperature Limits Report (TAC No. ME7930)

References: 1) NSPM to NRC, "License Amendment Request: Revise and Relocate Pressure Temperature Curves to a Pressure Temperature Limits Report," (L-MT-12-002) dated January 20, 2012. (ADAMS Accession No. ML12033A175)

2) NRC e-mail to NSPM, "Monticello Nuclear Generating Plant – Request for Additional Information re: License Amendment Request to Relocate P-T Curves (TAC No. ME7930)," dated October 10, 2012.

3) SIR-05-044, "Pressure Temperature Report Methodology for Boiling Water Reactors." Revision 0.

4) NRC (H. K. Nieh) to Southern Nuclear Operating Company (R.C. Bunt), "Final Safety Evaluation for the Boiling Water Reactor Owners' Group (BWROG) Structural Integrity Associates Topical Report (TR) SIR-05-044, "Pressure Temperature Report Methodology for Boiling Water Reactors," (TAC No. MC9694)," dated February 6, 2007. (ADAMS Accession No. ML053560336)

On January 20, 2012, in accordance with 10 CFR 50.90, the Northern States Power Company – Minnesota (NSPM), doing business as Xcel Energy, Inc., submitted a license amendment request (LAR) (Reference 1) to revise the Monticello Nuclear Generating Plant (MNGP) Technical Specifications (TSs) to add a Pressure and Temperature Limit Report (PTLR) incorporating new pressure-temperature (P-T) limit curves.

A001
NRR

On October 10, 2012, the U. S. Nuclear Regulatory Commission (NRC) requested additional information (RAI) from NSPM (Reference 2) with respect to the development of the P-T limit curves and whether they considered all reactor vessel materials (beltline and non-beltline) and the lowest service temperature of all ferritic RCPB materials, consistent with the requirements of 10 CFR Part 50, Appendix G. On November 14, 2012, a teleconference was held between the NRC and NSPM to clarify the information required in the RAI response. The RAI and NSPM's response is provided below.

NRC RAI

The regulations in 10 CFR Part 50, Appendix G, Paragraph IV.A state that, "*the pressure-retaining components of the reactor coolant pressure boundary [RCPB] that are made of ferritic materials must meet the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code [ASME Code, Section III], supplemented by the additional requirements set forth in* [paragraph IV.A.2, "Pressure-Temperature (P-T) Limits and Minimum Temperature Requirements"]. Therefore, 10 CFR Part 50, Appendix G requires that P-T limits be developed for the ferritic materials in the reactor vessel (RV) beltline (neutron fluence > 1×10^{17} n/cm^2, E > 1 MeV), as well as ferritic materials not in the RV beltline (neutron fluence < 1×10^{17} n/cm^2, E > 1 MeV). Further, 10 CFR Part 50, Appendix G requires that all RCPB components must meet the ASME Code, Section III requirements. The relevant ASME Code, Section III requirement that will affect the P-T limits is the lowest service temperature requirement for all RCPB components specified in Section III, NB-2332(b).

1. The P-T limit calculations for ferritic RCPB components that are not RV beltline shell materials may define P-T curves that are more limiting than those calculated for the RV beltline shell materials due to the following factors: RV nozzles, penetrations, and other discontinuities have complex geometries that may exhibit significantly higher stresses than those for the RV beltline shell region. These higher stresses can potentially result in more restrictive P-T limits, even if the reference temperature (RT_{NDT}) for these components is not as high as that of RV beltline shell materials that have simpler geometries.

2. Ferritic RCPB components that are not part of the RV may have initial RT_{NDT} values, which may define a more restrictive lowest operating temperature in the P-T limits than those for the RV beltline shell materials.

Please describe how the P-T limit curves submitted for MNGP and the methodology used to develop these curves, considered all RV materials (beltline and non-beltline) and the lowest service temperature of all ferritic RCPB materials, consistent with the requirements of 10 CFR Part 50, Appendix G.

NSPM Response

NSPM applied the methodology described in Structural Integrity Associates (SIA) Topical Report SIR-05-044-A, "Pressure Temperature Report Methodology for Boiling Water Reactors," to develop the P-T limits for the MNGP (Reference 3). The methodology in Topical Report SIR-05-044 implements the requirements contained in Appendix G to 10 CFR Part 50, "Fracture Toughness Requirements" and ASME Code, Section XI, Appendix G. The methodology also addresses all RCPB components both beltline and non-beltline. The NRC has reviewed the methodology described in Topical Report SIR-05-044-A and approved the report by issuance of a Safety Evaluation dated February 6, 2007 (Reference 4). Additional details on development of the P-T limits for MNGP are provided below.

MNGP Calculation 11-005 (provided in Reference 4), "Revised P-T Curves", was prepared using the methodology described in SIR-05-044-A and concludes that the beltline, bottom head, and feedwater nozzle/upper regions are the only portions of the RCPB that have the potential to regulate the P-T limitations. Calculation 11-005 updates the P-T limits for the reactor vessel ferritic materials in the beltline, bottom head, and feedwater nozzle/upper vessel regions of the reactor pressure vessel (RPV).

The limiting beltline material for the MNGP RPV is a combination of the Lower/Intermediate Plates and the recirculation inlet (N2) nozzles. There are no other nozzles (including instrumentation nozzles) in the MNGP beltline. The N2 nozzles introduce specific stress concentration effects and thermal transients that were evaluated by a finite element analysis. A composite P-T limit curve was developed which incorporated both the beltline and the N2 nozzle P-T curves.

P-T limits for MNGP also consider the upper vessel and bottom head. The feedwater nozzle in the upper vessel region is the limiting non-beltline component since it is a large nozzle (i.e., a stress concentrator) and experiences more thermal transients when compared to the rest of the upper vessel region. The feedwater nozzle was evaluated by finite element analysis and the results were incorporated into the P-T limit curves as part of the upper vessel region. The P-T limit was also determined for the bottom head region and incorporated into the P-T curves; however they remain bounded by the beltline and P-T limit curves. The recirculation inlet nozzle/beltline, feedwater nozzle/upper vessel and bottom regions of the vessel are bounding for the ferritic RCPB reactor vessel components.

The P-T limit curves are intended to prevent non-ductile failure of ferritic components. With regard to ferritic RCPB components that may not be a part of the RV, ASME Section III, NB-2332(b) requires that:

> Pressure retaining material, other than bolting with nominal wall thickness over 2½ in. for piping (pipe and tubes) and material for pumps, valves and fittings with any pipe connections of nominal wall thickness greater than 2½ in. shall meet the requirements of NB-2331. The lowest service temperature shall not be lower than RT_{NDT} + 100F unless a lower temperature is justified by following methods similar to those contained in Appendix G.

MNGP does not have any RCPB material with a nominal wall thickness greater than 2.5 inches. The largest Class 1 RCPB piping is the 28 inch recirculation outlet piping which has a nominal wall thickness of 1.146 inches. The recirculation outlet piping is not ferritic and therefore not included under the requirements of ASME Section III, NB-2332(b). The main steam lines are the largest ferritic Class 1 RCPB piping and are significantly smaller at 18 inches with a nominal wall thickness of 0.937 inches. Other Class 1 RCPB components are significantly smaller with a nominal wall thickness well below 2.5 inches, including all of the ferritic RCPB components.

Therefore, the P-T limit curves submitted for MNGP, developed applying the methodology contained in Topical Report SIR-05-044 (which implements the requirements of 10 CFR 50, Appendix G), considered all RV materials (beltline and non-beltline).

Summary of Commitments

This letter proposes no new commitments and does not revise any existing commitments.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on December 07, 2012.

Mark A. Schimmel
Site Vice President, Monticello Nuclear Generating Plant
Northern States Power Company – Minnesota

cc: Administrator, Region III, USNRC
Project Manager, Monticello, USNRC
Resident Inspector, Monticello, USNRC
Minnesota Department of Commerce