



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

August 10, 2012

Mr. Brian J. O'Grady  
Vice President-Nuclear and CNO  
Nebraska Public Power District  
72676 648A Avenue  
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION - REQUEST FOR ADDITIONAL INFORMATION  
RE: LICENSE AMENDMENT REQUEST TO REVISE TECHNICAL  
SPECIFICATION 3.4.9, "RCS PRESSURE AND TEMPERATURE (P/T) LIMITS"  
(TAC NO. ME7324)

Dear Mr. O'Grady:

By letter dated September 22, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11272A057), Nebraska Public Power District (the licensee) submitted a license amendment request (LAR) to revise the Technical Specifications (TSs) for Cooper Nuclear Station. The proposed LAR would revise TS 3.4.9, "RCS [Reactor Coolant System] Pressure and Temperature (P/T) Limits," to include new pressure-temperature (P-T) limits for heat-up and cool-down operations with the core critical and core not critical, as well as for pressure test conditions. The proposed P-T limits would be valid for 32 effective full power years (EFPY) of facility operation. The proposed revisions to TS 3.4.9 also would revise surveillance requirements for verifying that the reactor vessel flange and reactor vessel head flange temperatures are greater than the revised minimum operating temperature (70 degrees Fahrenheit) specified for the proposed 32 EFPY P-T limits. By letter dated February 29, 2012 (ADAMS Accession No. ML120590085), the U.S. Nuclear Regulatory Commission (NRC) issued a request for additional information (RAI). By letter dated March 30, 2012 (ADAMS Accession No. ML12094A119), the licensee provided its RAI response.

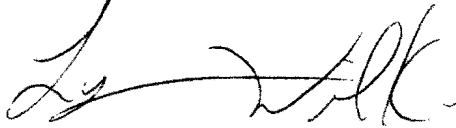
The NRC staff has reviewed your submittals and determined that additional information is needed for the staff to complete its evaluation. A portion of the RAIs were transmitted via e-mail to Mr. Edward McCutchen of your staff on May 7, 2012. The additional RAIs were discussed with Mr. McCutchen and others of your staff on June 5, 2012. Mr. McCutchen indicated via telephone on July 20, 2012, that the licensee's response would be provided within 30 days of receipt of this letter.

B. O'Grady

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If you have any questions, please contact me at 301-415-1377 or via e-mail at [Lynnea.Wilkins@nrc.gov](mailto:Lynnea.Wilkins@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read 'Lynnea Wilkins', with a long horizontal flourish extending to the right.

Lynnea E. Wilkins, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure:  
Request for Additional Information

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

By letter dated September 22, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11272A057), Nebraska Public Power District (the licensee) submitted a license amendment request (LAR) to revise the Technical Specifications (TSs) for Cooper Nuclear Station. The proposed LAR would revise TS 3.4.9, "RCS [Reactor Coolant System] Pressure and Temperature (P/T) Limits," to include new pressure-temperature (P-T) limits for heat-up and cool-down operations with the core critical and core not critical, as well as for pressure test conditions. The proposed P-T limits would be valid for 32 effective full power years (EFPY) of facility operation. The proposed revisions to TS 3.4.9 also would revise surveillance requirements for verifying that the reactor vessel flange and reactor vessel head flange temperatures are greater than the revised minimum operating temperature (70 degrees Fahrenheit) specified for the proposed 32 EFPY P-T limits. By letter dated February 29, 2012 (ADAMS Accession No. ML120590085), the U.S. Nuclear Regulatory Commission (NRC) issued a request for additional information (RAI). By letter dated March 30, 2012 (ADAMS Accession No. ML12094A119), the licensee provided its RAI response.

The NRC staff has reviewed and evaluated the information provided by the licensee and has determined that the following information is needed in order to complete its review:

1. The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix G, "Fracture Toughness Requirements," state, in part, that

This appendix specifies fracture toughness requirements for ferritic materials of pressure-retaining components of the reactor coolant pressure boundary of light water nuclear power reactors to provide adequate margins of safety...

In addition, 10 CFR Part 50, Appendix G, paragraph IV.A states, in part, that

The pressure-retaining components of the reactor coolant pressure boundary that are made of ferritic materials must meet the requirements of the ASME Code [American Society of Mechanical Engineers Boiler and Pressure Vessel Code], supplemented by the additional requirements set forth below [paragraph IV.A.2, "Pressure-Temperature Limits and Minimum Temperature Requirements"]...

Enclosure

Therefore, 10 CFR Part 50, Appendix G requires that P-T limits be developed for the entire reactor coolant pressure boundary (RCPB), consisting of ferritic RCPB materials in the reactor vessel (RV) beltline (neutron fluence  $\geq 1 \times 10^{17}$  n/cm<sup>2</sup>, E > 1 MeV), as well as ferritic RCPB materials not in the RV beltline (neutron fluence <  $1 \times 10^{17}$  n/cm<sup>2</sup>, E > 1 MeV).

P-T limit calculations for ferritic RCPB components that are not RV beltline shell materials, may define curves that are more limiting than those calculated for the RV beltline shell materials. This may be due to the following factors:

- a. 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<sub>NDT</sub>) for these components is not as high as that of RV beltline shell materials that have simpler geometries.
- b. Ferritic RCPB components that are not part of the RV may have initial RT<sub>NDT</sub> 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, 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.

2. Linear Elastic Fracture Mechanics (LEFM) evaluation of the N16 Water Level Instrument Nozzles: The licensee's LAR submittal, which includes Structural Integrity Associates (SIA) calculation package 1100445.303, provides a reference to the generic LEFM methodology used for calculating the applied stress intensity factor values for the N16 instrument nozzles. For Cooper, the N16 nozzles define part of the bounding beltline region P-T curves at low temperatures.

The generic LEFM methodology for boiling-water reactor instrument nozzles, provided in SIA Report No. 0900876.401, Revision 0, "Linear Elastic Fracture Mechanics Evaluation of General Electric Boiling Water Reactor Water Level Instrument Nozzles for Pressure-Temperature Curve Evaluation," November 2011 (ADAMS Accession No. ML11325A074), is currently under review by NRC staff. Please provide an alternate methodology for the stated instrument nozzles.

B. O'Grady

- 2 -

If you have any questions, please contact me at 301-415-1377 or via e-mail at [Lynnea.wilkins@nrc.gov](mailto:Lynnea.wilkins@nrc.gov).

Sincerely,

**/RA/**

Lynnea E. Wilkins, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-298

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Request for Additional Information

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**ADAMS Accession No.: ML12205A216**

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