R. Michael Glover
H. B. Robinson Steam Electric Plant Unit 2
Site Vice President

Duke Energy Progress
3581 West Entrance Road
Hartsville, SC 29550

O: 843 857 1704
F: 843 857 1319
Mike.Glover@duke-energy.com

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

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261 / RENEWED LICENSE NO. DPR-23

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO REVISE REACTOR COOLANT SYSTEM PRESSURE AND TEMPERATURE LIMITS

Dear Sir/Madam:

By letter dated November 2, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15307A069) Duke Energy Progress, Inc. (DEP) submitted a license amendment request (LAR) for H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP2). This LAR would revise the reactor coolant system (RCS) pressure and temperature (P-T) limits in the Technical Specifications (TSs) of the HBRSEP2. The proposed revision would extend the HBRSEP2 P-T limits applicability from the current 35 effective full power years (EFPY) up to 50 EFPY. The 50 EFPY P-T limits are based on the P-T limit curves developed in Westinghouse report, WCAP-15827, Revision 0, "H. B. Robinson Unit 2, Heatup and Cooldown Limit Curves for Normal Operation," March 2003, which was included as Attachment 4 to the submittal.

The Nuclear Regulatory Commission (NRC) staff determined that additional information is needed to complete its LAR review. A draft of that information request was received by DEP via electronic mail message dated March 2, 2016, which provided four (4) requests for additional information (RAIs).

An RAI clarification call was held on March 15, 2016 between NRC staff and DEP. DEP agreed to provide responses to RAIs 1, 2, and 4 by April 1, 2016, and the response to RAI 3 by September 30, 2016. The DEP responses to RAIs 1, 2, and 4 are provided herein.

Please address any comments or questions regarding this matter to Mr. Scott Connelly, Acting Manager – Nuclear Regulatory Affairs at (843) 857-1569.

There are no new regulatory commitments made in this letter.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 31, 2016.

Sincerely,

R. Michael Glover

R. Michael Glover
Site Vice President

RMG/jmw

Enclosure

cc: Region Administrator, NRC, Region II
Mr. Dennis Galvin, NRC Project Manager, NRR
NRC Resident Inspector, HBRSEP2
Ms. S. E. Jenkins, Manager, Infectious and Radioactive Waste Management Section (SC)

U. S. Nuclear Regulatory Commission
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5 Pages (including this cover page)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO REVISE REACTOR COOLANT SYSTEM PRESSURE AND TEMPERATURE LIMITS

REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST

REVISION OF REACTOR COOLANT SYSTEM PRESSURE AND TEMPERATURE LIMITS

DUKE ENERGY PROGRESS, INC.
DOCKET NO. 50-261

RAI-1

With respect to low temperature overpressure protection (LTOP) settings, the licensee stated the following in Attachment 1, Section 1.2 of the submittal: "Review of the low temperature overpressure protection limits confirmed that no changes are required as a result of the revised reactor pressure vessel analyses and limits." To verify this statement, the staff requests the licensee to describe the review performed that confirmed no changes to the LTOP settings are required. In addition to the description of the review, the response should include: (1) the enable temperature LTOP setting value and an explanation of its determination based on Section 3.4 "Enable Temperature for COMS" of WCAP-14040-NP-A, Revision 2, and (2) the pressurizer power-operated relief valve LTOP setting value (or range of values) and an explanation of its determination based on Section 3.2.2 "Pressure Limits Selections," Section 3.2.5 "Final Setpoint Selection," and Section 3.3 "Application of ASME Code Case N-514" of WCAP-14040-NP-A, Revision 2.

DEP Response:

1. Describe the review performed that confirmed no changes to the LTOP settings are required. (Review Extracted from EC 400486)

A review of the steady state heatup and cooldown curves in Attachment A, p. 2 shows that the 35 EFPY and 50 EFPY curves overlap at 180°F, the knee of the curve. Since the operating limits did not change at temperatures below 180°F, the current LTOP setpoint protecting this limit remains valid for the new curves. Above 180°F, the limit dropped 54 psi from 1270 psig to 1216 psig.

There are two Low Temperature Over Pressure (LTOP) system analyses for Robinson which demonstrate the RCS will not over-pressurize when the RCS temperature is below 350°F. The first is RNP-M/MECH-1631 which demonstrates the RCS will be protected at RCS temperatures below 175°F. This calculation will be revised as part of this EC. The second calculation is AREVA 32-9140092-000 which demonstrates the RCS is protected between 175°F and 350°F. Above 350°F, the LTOP system is not required to operate. Pressure limits will be revised for both of these calculations to correspond with the 50 EFPY curves. They continue to demonstrate acceptable results with the revised limits.

While RNP-M/MECH-1631 can simply be revised, the AREVA analysis is not entirely owned by Duke Energy. Therefore, a disposition is performed herein on the analysis. Two 35 EFPY pressure limits were provided for the LTOP analysis: 621 psig at temperatures of 60-180°F and 1270 psig at temperatures 180-350°F (note that the 621 pressure limit was conservatively applied at 180°F). The 50 EFPY pressure limits are 621 psig at temperatures of 60-180°F and 1216 psig at temperatures 180-350°F from WCAP-15827 Table 28, under the column providing 50 EFPY steady state temperature/pressure curve. As the peak pressure calculated for all temperatures was less than 621 psig (see AREVA calculation 32-9140092-000), there is still margin with these revised limits.

2. Include the enable temperature LTOP setting value and an explanation of its determination based on Section 3.4 "Enable Temperature for COMS" of WCAP-14040-NP-A, Revision 2. (Per RNP-M/MECH-1631)

The Low Temperature Overpressure Protection System (LTOP) is placed in service at 350°F. Per RNP-M/MECH-1631, methodology used to establish the LTOP setpoint at H.B. Robinson Unit 2 is described in the following rather than WCAP-14040-NP-A, Revision 2:

1. Westinghouse Owners Group Report Pressure Mitigating Systems Transient Analysis Results, July 1977

2. Westinghouse Owners Group Report Pressure Mitigating Systems Transient Analysis Results Supplement to the July 1977 Report, September 1977

3. Westinghouse Nuclear Safety Advisory Letter (NSAL) 93-005B, Cold Overpressure Mitigation System (COMS) Non-conservatism

The above calculation verifies the Setpoint + Overshoot + Inst Error + Static Head + Dynamic Head < App G Limit.

3. Include the pressurizer power-operated relief valve LTOP setting value (or range of values) and an explanation of its determination based on Section 3.2.2 "Pressure Limits Selections," Section 3.2.5 "Final Setpoint Selection," and Section 3.3 "Application of ASME Code Case N-514" of WCAP-14040-NP-A, Revision 2.
(Per RNP-M/MECH-1631)

The pressurizer power-operated relief valve LTOP setting value is 400 psig. Per RNP-M/MECH-1631, methodology used to establish the LTOP setpoint at H.B. Robinson Unit 2 is as described above.

RAI-2

The licensee in Attachment 1, Section 1.2 of the submittal identifies that the fluence values used in the analyses of the heatup and cooldown limits were updated and documented in WCAP-15805. WCAP-15805 describes how data from 4 capsules, with Capsule X being the most recently removed from the reactor pressure vessel at 20.39 EFPY, were used to provide projections of the neutron exposure of the reactor pressure vessel for operating periods extending to 50 EFPY.

Demonstrate that the greater than 1 MeV neutron fluence at the reactor vessel inner surface at 50 EFPY (projected in the WCAP-15805 Capsule X analysis using the average of Cycles 16 through 21) remains bounding based on core and operational design changes that occurred between 20.39 EFPY (when Capsule X was pulled) and 35 EFPY (end of the current licensing basis).

DEP Response:

Prior to submittal of this LAR the most recently evaluated dosimetry at RNP had been Capsule X which was pulled from the reactor vessel on April 29, 2001 (20.39 EFPY) and the neutron fluence at the reactor vessel inside surface was calculated and reported in WCAP-15805. The fast neutron [E> 1.0 MeV] end of life fluence at the clad/base metal interface for the extended period of operation or 50 EFPY was projected to be 6.00E19 n/cm2.

More recently, the ex-vessel neutron dosimetry was removed and analyzed from RNP after cycle 29 (33.18 EFPY) and the calculated neutron fluence was reported in WCAP-18100-NP. This report projected the fast neutron [E> 1.0 MeV] end of life fluence at the clad/base metal interface for the extended period of operation or 50 EFPY to be 5.69E19 n/cm2. This most recent dosimetry read demonstrates that the fluence values used in the analyses of the heatup and cooldown limits submitted in this LAR are bounded up to 33.18 EFPY of plant operation.

There are no core and/or operational design changes planned for RNP during the period between 33.18 and 35 EFPY except for the current cycle (Cycle 30) being a 19.5 month cycle. Therefore, the projected fast neutron fluence values reported in WCAP-18100-NP remain valid beyond 33.18 EFPY and proves the fluence values originally used in the development of the submitted heatup and cooldown limits are still bounding.

RAI-3

Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Appendix G, requires that P-T limits be developed to bound all ferritic materials in the reactor pressure vessel (RPV). Regulatory Issue Summary 2014-11, "Information on Licensing Applications for Fracture Toughness Requirements for Ferritic Reactor Coolant Pressure Boundary Components," dated October 14, 2014 (ADAMS Accession No. ML14149A165) clarifies that P-T limit calculations for ferritic RPV materials other than those materials with the highest reference temperature may define P-T curves that are more limiting because the consideration of stress levels from structural discontinuities (such as RPV inlet and outlet nozzles) may produce a lower allowable pressure. The staff noted that the licensee addressed the fluence levels of the RPV inlet and outlet nozzles for the 50 EFPY in WCAP-15827, Table 6, "Summary of the Vessel Surface, 1/4T and 3/4T Fluence Values used for the Generation of the 30, 35, 40, 45 and 50 EFPY Heatup/Cooldown Curves," and reported the adjusted reference temperatures (ART) for the RPV inlet and outlet nozzles in Table 16, "Calculation of the ART Values for the 1/4T Location @ 50 EFPY" and Table 17, "Calculation of the ART Values for the 3/4T Location @ 50 EFPY." However, WCAP-15827 does not have P-T limit calculations for the RPV inlet and outlet nozzles, and therefore, does not demonstrate how the P-T limit curves developed for 50 EFPY bound all ferritic pressure boundary components of the RPV.

Therefore, the staff requests the licensee to provide P-T limit calculations for the Robinson RPV inlet and outlet nozzles or otherwise demonstrate how the P-T limit curves developed for 50 EFPY in WCAP-15827 bound all ferritic pressure boundary components of the RPV. In the P-T limit calculations for the Robinson RPV inlet and outlet nozzles, the staff requests the following to be used: 1) the ART values of the Robinson RPV inlet nozzle, outlet nozzle, and "Nozzle Welds" in Tables 16 and 17 of WCAP-15827, and 2) consideration of the stress levels in the welds that attach the Robinson RPV inlet and outlet nozzles to the RPV. Lastly, the staff requests the licensee to confirm that here are no other ferritic pressure boundary components of the Robinson RPV that need to be considered for P-T limit evaluation for the period of extended operation.

DEP Response:

The calculations for the reactor vessel nozzles are currently being performed by Westinghouse and the DEP response to RAI-3 will be conveyed via supplemental submittal.

RAI-4

According to the licensee, TS Figures 3.4.3-1, "Reactor Coolant System Heatup Limits Applicable Up to 35 EFPY," and 3.4.3-2, "Reactor Coolant System Cooldown Limits Applicable Up to 35 EFPY," would be revised to indicate that the curves are applicable up to 50 EFPY.

The staff's review of the application, especially, the proposed changes to P-T limit curves, finds that the limits in these Figures only contain values for RCS pressure greater than 0 pounds per square inch gauge. However, based on a review of similar changes for other licensee's applications, it is also the staff's understanding that it is a common practice for a licensee to perform a vacuum-fill operation for a short period of time during startup, i.e., a vacuum is drawn in the RCS while filling with water. The staff finds that the licensee does not mention a vacuum fill operation explicitly in its application.

If the licensee plans to perform an RCS vacuum-fill operation at its Robinson facility, the staff requests the licensee to confirm that such operation is below and to the right of the proposed limit lines, which represent pressure-temperature limits for a normal heatup and cooldown of the primary RCS.

DEP Response:

Robinson does not perform an RCS vacuum-fill operation as referenced in GP-001, "Fill and Vent of the Reactor Coolant System."