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10 CFR 54.21

Serial: RNP-RA/13-0134

JAN 09 2014

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United States Nuclear Regulatory Commission
Washington, DC 20555-0001

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

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION RELATED TO
THE PRESSURIZED WATER REACTOR INTERNALS PROGRAM PLAN FOR AGING
MANAGEMENT OF REACTOR INTERNALS (TAC NO. ME9633)

Ladies and Gentlemen:

By letter dated September 23, 2013, the NRC requested that Duke Energy Progress, Inc., respond to a third request for additional information (RAI) regarding the Aging Management Program for the Reactor Vessel Internals at Robinson Nuclear Power Plant. The Duke Energy Progress response to this RAI is provided in the enclosure to this letter.

In addressing RAI 3-2-A, H. B. Robinson Steam Electric Plant (RNP) will demonstrate that adverse impact to the credited safety function of the Lower Support Column Assembly is precluded. RNP will demonstrate that the ferrite content levels of the columns inhibits degradation. Also, consistent with the expectation reflected in RAI 3-2-A-a and RAI 3-2-A-b, RNP will pursue an analysis that would provide reasonable assurance that the number of columns predicted to experience degradation (in the absence of inspection data for the columns) are smaller than the number of columns that are required to ensure the intended safety function of the lower core support assembly would be fulfilled. Subsequent to the NRC review and approval of the stated analysis, an inspection of the lower support columns will commence, if warranted.

It is noted, the current absence of an analysis that would identify the success criteria (i.e., how many columns can be in a failed state without negating the capability of the assembly to perform its intended safety function), the absence of an existing acceptance criteria (i.e., what level of degradation constitutes a failed-state for a given column), and the absence of an existing inspection plan that is capable of overcoming the technical feasibility challenges would give rise to a potential inspection undertaking, whose merit is questionable. However, RNP hereby expresses its willingness to seek solutions to the stated absences, in order to perform an inspection of the columns in the near future.

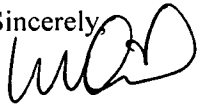
There are no regulatory commitments made in this submittal. If you have any questions regarding this submittal, please contact Mr. R. Hightower at (843) 857-1329.

ADD
NRR

I declare under penalty of perjury that the foregoing is true and correct.

Executed On: 1/9/14

Sincerely,

A handwritten signature in black ink, appearing to read 'W. R. Gideon', written over the word 'Sincerely,'.

William. R. Gideon
Site Vice President

WRG/am

Enclosure: RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION RELATED TO
 THE PRESSURIZED WATER REACTOR INTERNALS PROGRAM PLAN FOR
 AGING MANAGEMENT OF REACTOR INTERNALS

cc: Mr. V. M. McCree, NRC, Region II
 Mr. Siva P. Lingam, NRC Project Manager, NRR
 NRC Resident Inspector, HBRSEP Unit No. 2

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION RELATED TO THE
PRESSURIZED WATER REACTOR INTERNALS PROGRAM PLAN FOR AGING MANAGEMENT
OF REACTOR INTERNALS (TAC NO. ME9633) DOCKET NO. 50-261

NRC REQUEST FOR ADDITIONAL INFORMATION (RAI)

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated September 26, 2012, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12278A398 and ML12278A399), Duke Energy Progress, Inc., submitted an Aging Management Program (AMP) for the reactor vessel internals for H. B. Robinson Steam Electric Plant (HBRSEP), Unit No.2. Based on the review of HBRSEP's AMP conducted thus far, the NRC staff developed three RAIs. Duke Energy Progress has provided its response to the first two RAIs. This enclosure contains HBRSEP's responses to the third RAI (RAIs 3-1, 3-2-A and 3-3).

RAI 3-1:

The NRC staff and EPRI met on November 28, 2012 (ADAMS Accession No. ML13014A672), January 22-23, 2013 (ADAMS Accession No. ML13042A048), and February 25, 2013 (ADAMS Accession No. ML13067A262) to facilitate development of a generic approach for resolution of Applicant/Licensee Action Item 1. As discussed in References 1 and 2, the NRC staff requests the licensee to provide the following information related to verification of the applicability of MRP-227-A to RNP. This is the initial RAI for Action Item 1.

1. Do the RNP RVI have non-weld or bolting austenitic stainless steel components with 20% cold work or greater, and if so do the affected components have operating stresses greater than 30 ksi? If so, perform a plant-specific evaluation to determine the aging management requirements for the affected components.
2. Have RNP ever utilized a typical fuel design or fuel management that could make the assumptions of MRP-227-A regarding core loading/core design non-representative for that plant, including power changes/uprates? If so, describe how the differences were reconciled with the assumptions of MRP- 227-A or provide a plant-specific aging management program for affected components as appropriate.

Response to RAI 3-1:

The Materials Reliability Program (MRP) released a guideline in October 2013, MRP 2013-025 [1], to aid in responding to the requests the NRC provided in RAI 3-1. The NRC affirmed the industry guideline as acceptable during the public meeting on November 19, 2013 (ADAMS ML13322A482). RNP will provide a detailed response aligned with MRP 2013-025 by August 31, 2014 and factor the conclusions into the PWR Vessel Internals Program.

RAI 3-2-A:

On September 12, 2013 the NRC staff performed an audit of proprietary documents supporting the licensee's functionality analysis of the lower support columns for MRP-227-A Action Item 7. These documents included WCAP-17254-P, Rev. 1 "Background and Technical Basis Supporting Engineering Flaw Acceptance Criteria for H.B. Robinson Unit 2 Reactor Vessel Internals MRP-227 Primary and Expansion Components," which was cited in the licensee's response to RAI 5(a), and additional reports and a calculation. The NRC staff determined the documents audited do not demonstrate functionality of the lower core support columns for RNP. The NRC staff understands that acceptance criteria in WCAP-17254-P for the lower support columns are based on prevention of fuel assembly damage, which may result in a smaller allowable number of failed columns than the number of columns that could fail without preventing safe shutdown of the reactor. Hence, the NRC staff does not require the licensee to submit WCAP-17254-P on the docket as a part of its response to RAI 3-2 dated August 26, 2013. However, the NRC staff requests that the licensee should provide information that addresses the following essential issues related to the functionality of the cast austenitic stainless steel (CASS) lower support columns:

- (a) Provide the number of lower support columns that could fail and still permit the intended function of the lower core support structure to be fulfilled.
- (b) The analysis must provide reasonable assurance that the allowable number of failed columns from (a) bounds the number of columns that are predicted to experience degradation that would render the column nonfunctional, in the absence of inspection data for the columns.

- (c) Explain how the functionality analysis considered aging degradation mechanisms identified as applicable the columns in MRP-227-A, or justify why these mechanisms are not relevant to the analysis, specifically:
- a. Loss of fracture toughness due to irradiation embrittlement and thermal embrittlement;
 - b. Cracking due to irradiation-assisted stress corrosion cracking

Response to RAI 3-2-A:

As a result of industry meetings on November 19, 2013 (Meeting package ML1326A047, Notice ML13291A037 [2] and Staff Presentation Package ML13322A478) and December 3, 2013 (Summary MLXXXXXAXXX²; Notice ML13329A046 [3]; Meeting Package ML13338A269; Presentation ML13338A262), the NRC provided alternate direction for responding to RAI 3-2-A and indicated this RAI would be revised. RNP previously provided a summary of the ferrite content for all lower support column bodies indicating that the columns are not susceptible to thermal embrittlement (TE). Consistent with the recent meeting discussions, evaluations for the ferrite content of the lower support column bodies indicate that all of the RNP columns are less than 18.5% delta ferrite.

Also, consistent with the expectation reflected in RAI 3-2-A-a and RAI 3-2-A-b, RNP will pursue an analysis that would provide reasonable assurance that the number of columns predicted to experience degradation (in the absence of inspection data for the columns) are smaller than the number of columns that are required to ensure the intended safety function of the lower core support assembly would be fulfilled. Subsequent to the NRC review and approval of the analysis, an inspection of the lower support columns will occur, if necessary.

It is noted, the current absence of an analysis that would identify the success criteria (i.e., how many columns can be in a failed state without negating the capability of the assembly to perform its intended safety function), the absence of an existing acceptance criteria (i.e., what level of degradation constitutes a failed-state for a given column), and the absence of an existing inspection plan that is capable of overcoming the technical feasibility challenges would give rise to a potential inspection undertaking, whose merit is questionable. However, RNP hereby expresses its willingness to seek solutions to these absences, in order to perform an inspection of the columns in the near future.

RAI 3-3:

In its response to the NRC staff's RAI-3, dated March 27, 2013, the licensee by a letter dated May 23, 2013, stated that Alloy X-750 material that is used for clevis insert bolts did not receive high temperature heat treatment (HTH) and, therefore, this material might be susceptible to primary water stress corrosion cracking (PWSCC). Appendix A to MRP-227-A indicates that failures of Alloy X-750 clevis insert bolts were reported by one Westinghouse-designed plant in 2010. Appendix A to MRP-227-A also stated that the most likely cause for failure was primary water stress corrosion cracking (PWSCC). The only aging mechanism requiring management by MRP-227-A for the clevis insert bolts is wear. The clevis insert bolts are categorized as an "Existing Programs" component under MRP-227-A, with the ASME Code, Section XI Inservice Inspection Program credited for managing aging due to wear only. The ASME Code, Section XI specifies a VT-3 visual inspection for the clevis insert bolts, which may not be adequate to detect cracking before it results in bolt failure. Therefore, the licensee is requested to discuss if it will modify the MRP-227-A inspection requirement for clevis insert bolts to require an inspection that will detect cracking. If the inspection requirement is not modified,

provide a technical justification for the adequacy of the existing VT-3 visual inspection requirement to detect cracking before it results in clevis insert bolt failure.

Response to RAI 3-3:

Industry efforts are on-going to investigate recent operating experience on cracking of the clevis insert bolts. The results of this investigation are projected to be provided to the industry in January 2014 and will need to be factored into the evaluation for RNP. The RNP response to this RAI will address whether this recent operating experience has any impact on the plant-specific assessment. RNP will provide a detailed response concerning the MRP-227-A inspection requirement for clevis insert bolts by March 31, 2014.

² The summary letter from the December 3, 2013 NRC closed meeting has not been released; therefore, the NRC ADAMS number is currently not available.

References to RAI Responses:

1. EPRI Materials Reliability Program Document, MRP 2013-025, "MRP-227-A Applicability Template Guideline," October 14, 2013.
2. U.S. NRC Memorandum, "Forthcoming Meeting on the Resolution of Plant-Specific Action Items Related to MRP-227-A, Reactor Internals Aging Management Programs/Inspection Plans," November 4, 2013 (ML13291A037).
3. U.S. NRC Memorandum, "Forthcoming Closed Meeting on the Resolution of Plant-Specific Action Items Related to MRP-227-A Reactor Internals Aging Management Programs/Inspection Plans," November 25, 2013 (ML13329A046).