

NRR-PMDAPEm Resource

From: Barillas, Martha
Sent: Friday, July 17, 2015 3:52 PM
To: 'Arthur.Zaremba@duke-energy.com'; Helton, Shana
Cc: Barillas, Martha; Galvin, Dennis; 'Richard.Hightower@duke-energy.com'; Caves, John
Subject: DRAFT RAI: Duke LAR for Robinson and Harris on DPC-NE-2005-P, Rev.5 (MF5872/MF5873)
Attachments: DRAFT - Harris-Robinson SCD Methodology - RAI.docx

Mr. Zaremba,

By letter dated March 5, 2015 (Agencywide Document Access and Management System (ADAMS) Accession No. ML15075A211), Duke Energy Progress, Inc. (Duke Energy), the licensee, submitted a request, in accordance with 10 CFR 50.90, for H. B. Robinson Steam Electric Plant, Unit 2, and Shearon Harris Nuclear Power Plant, Unit 1, to amend their Technical Specifications to adopt the methodology report, DPC-NE-2005-P, Revision 5, "Thermal-Hydraulic Statistical Core Design Methodology." To complete its review, the NRC staff has the following request for additional information (RAI) attached in DRAFT form.

A Sensitive Unclassified Non-Safeguards Information (SUNSI) review was completed by the staff on the draft RAI and the staff concluded the draft RAI do not contain SUNSI and no information needs to be withheld in accordance with 10 CFR 2.390. If you do not agree with the staff determination and find information needs to be withheld, it is requested you identify the information you believe needs to be withheld in the attached document and respond within 5 working days.

If a clarification call is needed to discuss the attached draft RAI, it is requested you respond by July 22, 2015, with a proposed date.

We request the RAI response within 30 days of receipt of this email. If you do not believe you can meet this date, please provide an acceptable alternate date.

If circumstances result in the need to revise the response date, please contact me at (301) 415-2760 or via e-mail Martha.Barillas@nrc.gov.

Respectfully,

Martha Barillas
Project Manager
Shearon Harris & H. B. Robinson
NRR/DORL/Licensing Branch II-2
US Nuclear Regulatory Commission
301-415-2760

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Subject: DRAFT RAI: Duke LAR for Robinson and Harris on DPC-NE-2005-P, Rev.5
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From: Barillas, Martha

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DRAFT - Harris-Robinson SCD Methodology - RAI.docx		26706

Options

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DRAFT Request for Additional Information on
Duke Energy Progress, Inc. Application to Revise TS for Methodology Report
DPC-NE-2005-P, Rev. 5, "Thermal-Hydraulic Statistical Core Design Methodology," at Shearon
Harris Nuclear Power Plant, Unit 1, and H. B. Robinson Steam Electric Plant, Unit 2.
(MF5872/MF5873)

By letter dated March 5, 2015 (Agencywide Document Access and Management System (ADAMS) Accession No. ML15075A211), Duke Energy Progress, Inc. (Duke Energy), the licensee, submitted a request, in accordance with 10 CFR 50.90, for H. B. Robinson Steam Electric Plant, Unit 2, and Shearon Harris Nuclear Power Plant, Unit 1, to amend their Technical Specifications to adopt the methodology report, DPC-NE-2005-P, Revision 5, "Thermal-Hydraulic Statistical Core Design Methodology." Duke Energy's statistical core design (SCD) methodology is described in the base DPC-NE-2005-PA report, which was originally approved by the NRC in 1995¹. Subsequent revisions have added appendices containing plant-specific data that apply the SCD methodology to individual Duke Energy plants and particular fuel types. The proposed revision to this report consists of Appendices H and I that apply this methodology to Robinson and Harris, respectively. In its submittal, Duke Energy also requested the adoption of DPC-NE-2005-P, Rev. 5, into the Harris and Robinson technical specifications (TS) Core Operating Limits Report (COLR) reference lists, located in TS 5.6.5.b and TS 6.9.1.6.2, respectively.

The SCD methodology proposed for use at Harris and Robinson describes a means of calculating a statistical limit on the departure from nucleate boiling ratio (DNBR), below which fuel failure may occur. General Design Criterion (GDC) 10 from Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," requires licensees to ensure that specified acceptable fuel design limits (SAFDLs), such as this DNBR limit, are not exceeded during normal operation, including the effects of anticipated operational occurrences (AOOs). In order to assure compliance with GDC 10, the NRC staff is therefore requesting the following additional information.

SNPB-RAI-1: For both Harris and Robinson, Duke Energy proposed the use of the HTP critical heat flux (CHF) correlation. The HTP CHF correlation is described in EMF-92-153(P)(A), "HTP: Departure from Nucleate Boiling Correlation for High Thermal Performance Fuel," Revision 1² (References H-4/I-4 of Attachments 6 and 7 of Duke Energy's submittal) and was developed in the XCOBRA-IIIC code. As discussed in the submittal, Duke Energy has implemented the HTP correlation in the VIPRE-01 code, which is described in EPRI NP-2511-CC-A, "VIPRE-01: A Thermal Hydraulic Code For Reactor Cores"³ (Reference H-3/I-3 of Attachments 6 and 7 of the submittal).

¹ The NRC's safety evaluation for DPC-NE-2005-PA, Revision 0, may be found in pages 33 to 46 of DPC-NE-2005-A, Revision 3 (ADAMS Accession No. ML023090299).

² ADAMS Accession No. ML051020017 (non-proprietary) and ML051020019 (proprietary)

³ ADAMS Accession Nos. ML102090545, ML102090544, ML102090543, and ML102070202 (proprietary)

Due to modeling differences between VIPRE-01 and XCOBRA-IIIC, the HTP critical heat flux correlation as implemented in VIPRE-01 is different from the one previously developed by AREVA and approved by the NRC. The NRC staff requests Duke Energy provide the benchmarking data for the VIPRE-01 HTP implementation (i.e., the calculations and experimental data presented in Figures H-3 through H-6 and I-3 through I-6 of submittal attachments 6 and 7). The data provided should specifically correspond to the data presented in Tables 3.8, 3.9, A.8, and A.9 of Reference H-4/I-4 of submittal attachments 6 and 7, EMF-92-153(P)(A), Rev. 1.

- SNPB-RAI-2: As discussed in submittal attachments 6 and 7, the VIPRE-01 model proposed for use in the SCD analysis at Robinson and Harris is based on one contained in DPC-NE-3000-PA, "Thermal-Hydraulic Transient Analysis Methodology," Revision 5a (Reference H-1/I-1 of Attachments 6 and 7 to the submittal). Please provide Revision 5a of DPC-NE-3000-PA.
- SNPB-RAI-3: Duke Energy provided statepoints for the SCD analysis at Robinson and Harris in Tables H-4 and I-4 of submittal attachments 6 and 7. Please provide:
- (a) how the statepoints were selected and determined to be potentially limiting with respect to critical heat flux concerns;
 - (b) how the statepoints are used in the SCD analysis, and how it will be determined whether or not to evaluate the minimum DNBR from a particular transient analysis case against the SCD limit; and
 - (c) the relationship between the axial peak and radial peaking (F_z and $F_{\Delta H}$) from Tables H-4 and I-4 and the peaking factors presented in the Robinson and Harris COLRs.
- SNPB-RAI-4: Duke Energy provided the uncertainties used in the SCD analysis at Robinson and Harris in Tables H-5 and I-5 of submittal attachments 6 and 7. The same tables also included brief justifications; however, several of these justifications require additional detail and as well as further justification of the magnitudes of the uncertainties. Please provide additional discussion and quantitative justification for the proposed uncertainties for the following parameters: coolant flow measurement, bypass flow, pressure, axial peaking factor, and axial peak location. Provide additional discussion of how the code/model uncertainty was determined.
- SNPB-RAI-5: Duke Energy provided results from two different sets of statepoints in Tables H-6 and I-6 of submittal attachments 6 and 7. Five hundred case runs were performed for statepoints in one set, while five thousand case runs were performed for statepoints in the other set, which is a subset of the first.
- (a) How were the 5,000-run statepoints were selected from the set of 500-run statepoints?

(b) Why are the higher statistical design limits from the set of 500-run statepoints not considered in the determination of the final statistical design DNBR limit?