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J. D. Woodard
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Southern Nuclear Operating Company
the southern electric system

January 15, 1992

Docket Nos. 50-348
50-364

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

Joseph M. Farley Nuclear Plant
VANTAGE-5 Fuel Design Amendment
Request for Additional Information

Gentlemen:

By letter dated July 15, 1991, Alabama Power Company submitted proposed changes to the Technical Specifications to support future core reloads with Westinghouse VANTAGE-5 fuel in Farley Units 1 and 2 and the implementation of the RTD Bypass Elimination (RTDBE) modification in Farley Unit 2. Your letter dated January 3, 1992 requested additional information regarding this submittal. Southern Nuclear Operating Company letter dated January 10, 1992 responded to question 4 of the requested information pertaining to VANTAGE-5. The remaining requested information relating to VANTAGE-5 is provided in Attachments 1 and 2, and the information relating to the RTDBE modification is provided in Attachment 3.

Westinghouse authorization letter CAW-92-253 and accompanying Affidavit, Proprietary Information Notice, and Copyright Notice are also enclosed with Attachment 2 because this attachment contains information proprietary to Westinghouse Electric Corporation which is supported by the affidavit signed by Westinghouse, the owner of the information. (Attachment 4 is included as the nonproprietary version of Attachment 2.) The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.790 of the Commission's regulations. Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse affidavit should reference letter CAW-92-253 and should be addressed to R. P. DiPiazza, Manager of Nuclear Safety Licensing, Westinghouse Electric Corporation, P. O. Box 355, Pittsburgh, Pennsylvania, 15230-0355.

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Should you have any questions, please advise.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

J. D. Woodard

JDW/MGE:map 1603

Attachments

cc: Mr. S. D. Ebneter
Mr. S. T. Hoffman
Mr. G. F. Maxwell
Dr. C. E. Fox

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 15th DAY OF January, 1992

Notary Public

My Commission Expires: 9-14-94

ATTACHMENT 1

Joseph M. Farley Nuclear Plant
Response To NRC Request For Additional Information
VANTAGE-5 Fuel

1. NRC Request

The statistical convolution method described in WCAP-10125 for the evaluation of initial fuel rod to nozzle growth gap has not been approved and should not be used for VANTAGE-5. Describe the method used to determine initial fuel rod to nozzle growth gaps in your evaluation of fuel rod performance.

ENP Response

To determine the initial fuel rod to nozzle growth gap as a result of fuel rod irradiation effects, fuel rod and fuel assembly growth combined with the worst case fabrication tolerances were evaluated in the fuel rod performance analysis (Attachment 4, page 8 of the Farley VANTAGE-5 Fuel Design Amendment) rather than using the statistical convolution method described in WCAP-10125. This is in compliance with Condition 1 of the VANTAGE-5 NRC Safety Evaluation Report, WCAP-10444-P-A.

2. NRC Request

Justify that sufficient margin exists between the design and safety limit DNBR values to cover the rod bow, transition core and other DNBR penalties for the first cycle transition to VANTAGE-5 fuel.

ENP Response

As discussed in the Farley VANTAGE-5 Fuel Design Amendment (Attachment 4, page 25), DNBR margin was maintained in the RTDP analyses by performing the safety analyses to meet DNBR limits higher than the design limit DNBR values. A fraction of the available DNBR margin is utilized to accommodate the transition core penalty. For VANTAGE-5 fuel, this transition core penalty is a function of the number of VANTAGE-5 fuel assemblies in the core based on the approved methodology given in Reference 1. The magnitude of the DNBR transition core penalty for the VANTAGE-5 fuel is given in Reference 2. There is no transition core penalty for the LOPAR fuel. Additional margin is used to offset the rod bow DNBR penalty as discussed in the Farley VANTAGE-5 Fuel Design Amendment.

A summary of the design limit and safety limit DNBR values as well as the DNBR margins and penalties for the first transition cycle is presented in Table 1. For FNP Units 1 and 2, rod bow and transition core are currently the only penalties which are offset by the available margin between the design limit and safety limit DNBR values. The table shows that there is sufficient DNBR margin for the first transition cycle to VANTAGE-5 fuel. Since the DNBR margins, penalties and benefits can change for each reload design, the net DNBR margin is evaluated as part of the cycle reload design process. The margin assessment in Table 1 is based

on 52 VANTAGE-5 fuel assemblies in the first transition cycle. This is the minimum number of VANTAGE-5 fuel assemblies currently planned for FNP Units 1 and 2. Since individual DNBR penalties and benefits are proprietary to Westinghouse, the DNBR penalties and benefits are combined into an approximate value in Table 1.

The DNBR margins which are presented in Table 1 are based on the analysis parameters from Table 4-1 of the Farley VANTAGE-5 Fuel Design Amendment (Attachment 4, page 22). The analysis parameters conservatively bound the licensing parameters for the FNP units. Considering the licensing parameters in Table 4-1, the net DNBR margin for the first transition cycle is significantly larger than the value based on the analysis parameters. Based on the fact that the Farley specific net DNBR margin for each unit can change on a reload to reload basis, only the design limit DNBR values are included in the Bases, since these values will not change as a result of a reload cycle design.

3. NRC Request

The RTDP for calculating DNB limits has been approved with certain conditions imposed upon its implementation because of the sensitivity of the method to changes in correlations and codes used. Explain how each of these conditions are accounted for in the use of the RTDP for FNP Units 1 and 2.

ENP Response

The NRC staff position identified seven conditions on the implementation of the RTDP for calculating DNB limits. The analyses which support the Farley VANTAGE-5 Fuel Design Amendment were performed within the limits of those conditions. Each of the conditions is listed and discussed below:

A. Condition 1
Sensitivity factors used for a particular plant and their ranges of applicability should be included in the Safety Analysis Report or reload submittal.

Response
Sensitivity factors were evaluated for the DNB correlations, the THINC-IV model, and parameter values for the specific application of RTDP to the FNP units. The factors and their range of application are described in Attachment 2, which is Westinghouse proprietary information. (Attachment 4 provides the nonproprietary version.)

B. Condition 2
Any changes in DNB correlation, THINC-IV correlations, or parameter values listed in Table 3-1 of WCAP-11397 outside of previously demonstrated acceptable ranges require re-evaluation of the sensitivity factors and of the use of Equation (2-3) of the topical report.

Response
See response to Item A above.

C. Condition 3

If the sensitivity factors are changed as a result of correlation changes or changes in the application or use of the THINC code, then the use of an uncertainty allowance for application of Equation (2-3) must be re-evaluated and the linearity assumption made to obtain Equation (2-17) of the topical report must be validated.

Response

Equation (2-3) and the linearity approximation made to obtain Equation (2-17) are still valid for FNP application. The sensitivity factors, operating parameters, and THINC-IV model used in this application are consistent with those used in WCAP-11397-P-A.

D. Condition 4

Variances and distributions for input parameters must be justified on a plant-by-plant basis until generic approval is obtained.

Response

The plant specific variances and distributions for this application are provided in proprietary reports WCAP-12769 (For RTD Bypass Loop) and WCAP-12771 (For RTD Bypass Loop Elimination). The non-proprietary versions of these reports are WCAP-12770 and WCAP-12772, respectively. All four WCAP's were supplied to the NRC with the Farley VANTAGE-5 Fuel Design Amendment.

E. Condition 5

Nominal initial condition assumptions apply only to DNBR analyses using RTDP. Other analyses, such as overpressure calculations, require the appropriate conservative initial condition assumptions.

Response

Nominal initial conditions were only applied to DNBR analyses which used RTDP.

F. Condition 6

Nominal conditions chosen for use in analyses should bound all permitted methods of plant operation.

Response

Bounding nominal conditions were used in the DNBR analyses which used RTDP.

G. Condition 7

The code uncertainties specified in Table 3-1 ($\pm$ 4 percent for THINC-IV and $\pm$ 1 percent for transients) must be included in the DNBR analyses using RTDP.

Response

The code uncertainties specified in Table 3-1 of WCAP-11397-P-A were included in the DNBR analyses using RTDP.

References

1. Schueren, P., McAtee, K. R., "Extension of Methodology for Calculating Transition Core DNBR Penalties," WCAP-11837-P-A, January 1990.

2. Letter from S. R. Tritch (Westinghouse) to R. C. Jones (USNRC), ET-NRC-91-3618, dated September 6, 1991, Subject: "VANTAGE-5 DNB Transition Core Effects."

3. Letter from J. D. Woodard, Alabama Power Company, to USNRC, July 15, 1991 (i.e., the Farley VANTAGE-5 Fuel Design Amendment).

TABLE 1

DNBR MARGIN SUMMARY FOR
FNP UNITS 1 AND 2

	LOPAR	VANTAGE-5
Design Limit DNBR		
Typical Cell	1.25	1.24
Thimble Cell	1.24	1.23
Safety Analysis Limit DNBR		
Typical Cell	1.35	1.47
Thimble Cell	1.34	1.45
DNBR Margin (Between Design and Safety Analysis Limit DNBR)		
Typical Cell	7.4%	15.6%
Thimble Cell	7.5%	15.2%
DNBR Penalties to Account for Rod Bow and First Transition Core *	< 2.0%	< 13.0%
Net DNBR Margin **	> 5.0%	> 2.0%

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* Based on the assumption of 52 VANTAGE-5 assemblies in the first transition cycle. The net DNBR margin for VANTAGE-5 fuel increases in the subsequent cycles due to a higher fraction of this fuel type being present in the core.

** This net DNBR margin is based on the analysis parameters from Table 4-1 of the Farley VANTAGE-5 Fuel Amendment (Attachment 4, page 22) which conservatively bound the licensing parameters. Considering the licensing parameters, the net DNBR margin for the first transition cycle is significantly larger (> 18% for LOPAR fuel and > 12% for VANTAGE-5 fuel).