May 25, 2006

Mr. B. F. Maurer, Acting Manager
Regulatory Compliance and Plant Licensing
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

SUBJECT: APPROVAL FOR INCREASE IN LICENSING BURNUP LIMIT TO 62,000 MWD/MTU (TAC NO. MD1486)

Dear Mr. Maurer:

The staff has previously approved topical reports WCAP-10444-P-A, "Reference Core Report, VANTAGE 5 Fuel Assembly," and WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Reference Core Report," with a limit on the burnup of 60,000 MWd/MTU. These fuel designs used PAD 3.4 described in WCAP-10851-P-A, "Improved Fuel Performance Models for Westinghouse Fuel Rod Design and Safety Evaluations," to evaluate the performance against fuel design criteria and the specified acceptable fuel design limits (SAFDLs). While PAD 3.4 was developed using data up to 62,000 MWd/MTU, PAD 3.4 was approved for fuel design applications only to the burnup limit of 60,000 MWd/MTU due to the lack of higher burnup data. The fuel criteria evaluation process (FCEP), as described in WCAP-12488-P-A, "Westinghouse Fuel Criteria Evaluation Process," was approved for use in evaluating design changes to WCAP-10444-P-A and WCAP-12610-P-A using PAD 3.4 and, therefore, was limited in applications to less than a burnup limit of 60,000 MWd/MTU.

Since these approvals were granted, Westinghouse Electric Company (Westinghouse) has submitted and received approval for a more recent revision of the PAD code (Version 4.0). WCAP-15063-P-A, "Westinghouse Improved Performance Analysis and Design Model (PAD 4.0)," was approved for use up to burnup limits of 62,000 MWd/MTU. However, none of the underlying documents have been revised to permit use of PAD 4.0 or to permit a modification of the burnup limit to 62,000 MWd/MTU. The Westinghouse practice was to use the FCEP process to extend the burnup limit on fuel from 60,000 MWd/MTU to 62,000 MWd/MTU. However, plant-specific use of the FCEP to extend the burnup limit required a license amendment, unless previously approved by the NRC.

By Letter No. LTR-NRC-06-21, dated April 19, 2006, Westinghouse requested a burnup extension of 2,000 MWd/MTU to a lead rod average of 62,000 MWd/MTU. The staff conducted an audit of the Westinghouse documents describing the fuel data, analytical models, and the fuel change procedures. The staff reviewed documents including several plant reload analyses. The reload analyses provided results for all the SAFDLs. The analyses were typically performed at bounding conditions such that plant thermal-mechanical safety evaluations were not required for each reload. The SAFDLs include rod internal pressure, clad stress and strain, corrosion, fuel melting temperature, clad fatigue, rod growth, and creep collapse, etc. The results showed that all SAFDLs were met for the bounding conditions.

The staff recognizes that the SAFDLs are analyzed using the PAD 4.0 code which is approved to 62,000 MWd/MTU lead rod average. The PAD 4.0 code also provides initial conditions for loss-of-coolant accidents (LOCAs) and anticipated operational occurrences (AOOs). The PAD 4.0 code is applicable to Westinghouse fuel designs of 14x14, 15x15 and 17x17 arrays. The

FCEP and the PAD 4.0 code do not apply to the Combustion Engineering (CE) fuel designs of 14x14 and 16x16 arrays.

Based on the results of its audit, the staff found that the models were qualified to a burnup of 62,000 MWd/MTU and that all the reload analytical requirements involving SAFDLs, LOCAs, and AOOs were met up to a burnup limit of 62,000 MWd/MTU. Therefore, the staff concludes that the burnup limits for WCAP-10444-P-A and WCAP-12610-P-A can be increased to a maximum of 62,000 MWd/MTU provided that the evaluation of the fuel design performance is performed with PAD 4.0. Further, the staff concludes that the use of the FCEP is valid up to a burnup limit of 62,000 MWd/MTU provided the change process uses PAD 4.0 to evaluate the effect of any proposed design change on the fuel. Finally, because the PAD 4.0 code applies only to Westinghouse fuel designs of 14x14, 15x15 and 17x17 arrays, the staff approval for increase in the burnup limit does not apply to the CE fuel designs of 14x14 and 16x16 arrays.

If you have any questions, please contact Mr. Girija Shukla at 301-415-8439.

Sincerely,

/RA by BReckley for/

Juan D. Peralta, Acting Chief
Special Projects Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 700

cc:
Mr. Gordon Bischoff, Manager
Owners Group Program Management Office
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

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Based on the results of its audit, the staff found that the models were qualified to a burnup of 62,000 MWd/MTU and that all the reload analytical requirements involving SAFDLs, LOCAs, and AOOs were met up to a burnup limit of 62,000 MWd/MTU. Therefore, the staff concludes that the burnup limits for WCAP-10444-P-A and WCAP-12610-P-A can be increased to a maximum of 62,000 MWd/MTU provided that the evaluation of the fuel design performance is performed with PAD 4.0. Further, the staff concludes that the use of the FCEP is valid up to a burnup limit of 62,000 MWd/MTU provided the change process uses PAD 4.0 to evaluate the effect of any proposed design change on the fuel. Finally, because the PAD 4.0 code applies only to Westinghouse fuel designs of 14x14, 15x15 and 17x17 arrays, the staff approval for increase in the burnup limit does not apply to the CE fuel designs of 14x14 and 16x16 arrays.

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