

December 16, 2011

Mr. James A. Gresham, Manager
Regulatory Compliance and Plant Licensing
Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

SUBJECT: NUCLEAR FUEL THERMAL CONDUCTIVITY DEGRADATION EVALUATION
FOR LIGHT WATER REACTORS USING WESTINGHOUSE CODES AND
METHODS (TAC NO. ME5186)

Dear Mr. Gresham:

The staff of the U.S. Nuclear Regulatory Commission (NRC) has concerns regarding the use of historical fuel thermal conductivity models in the safety analysis for operating reactor plants. This issue has been documented in Information Notice (IN) 2009-23 "Nuclear Fuel Thermal Conductivity Degradation" (Agencywide Document Access and Management System Accession No. ML091550527) dated October 8, 2009. Following the issuance of IN 2009-23, the NRC staff completed a preliminary review of the impact of fuel thermal conductivity models on the reactor safety analysis codes by the major fuel vendors. The enclosure to this letter provides the staff's assessment of Westinghouse Electric Company's (Westinghouse) models and computer codes used for light water reactors.

The NRC staff has determined that several currently approved analysis methods provide results that are less conservative than previously understood because they do not properly model thermal conductivity degradation as a function of burnup. Westinghouse recently presented information to the NRC staff that shows for a generic 3-Loop Westinghouse pressurized water reactor (PWR) the inclusion of a thermal conductivity degradation model in the safety analysis could cause compliance issues with the regulations of 10 CFR 50.46. However, Westinghouse has stated that its models contain substantial conservatism that, if credited, would more than compensate for the error in thermal conductivity degradation. It is incumbent upon Westinghouse to inform all licensees using Westinghouse evaluation model results of this new information so that the licensees remain in compliance with the regulations of 10 CFR 50.46.

In addition to ensuring 10 CFR 50.46 compliance, the NRC staff requests that Westinghouse evaluate the magnitude of the effect of fuel thermal conductivity degradation on the relevant parameters of interest outlined in the enclosure (e.g., fuel centerline temperature, peak cladding temperature, rod internal pressure), and determine whether the specified acceptable fuel design limits for any licensing basis analysis using Westinghouse models and codes are exceeded if the thermal conductivity degradation as a function of burnup is included in the analysis. The NRC staff anticipates that Westinghouse will enter this issue into its corrective action program.

Westinghouse's cooperation in providing information detailing the fuel thermal conductivity model(s) that Westinghouse is currently using in the safety analyses of operating reactors and a list of the operating reactors that are currently using Westinghouse thermal-hydraulic and fuel performance models and codes will assist the staff in resolving this issue. The NRC staff

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requests a telephone conference after receipt of this letter to discuss Westinghouse's plan forward. The staff anticipates receiving your written response to the stated concerns within 30 days of the issuance of this letter. Based on the information the staff receives from Westinghouse, the staff will be able to better plan any future actions on this issue.

The staff has issued NRC IN 2011-21, "Realistic Emergency Core Cooling System Evaluation Model Effects Resulting From Nuclear Fuel Thermal Conductivity Degradation" (ADAMS Accession No. ML113430785), dated December 13, 2011. This IN addresses the potential for thermal conductivity degradation to cause errors in realistic emergency core cooling system evaluation models. Additionally, the NRC staff will also issue an update to IN 2009-23 to communicate the concerns stated in this letter to licensees. If you have any questions regarding the enclosed document, please contact Mr. Anthony Mendiola at 301-415-1053.

Sincerely,

/RA/

Timothy J. McGinty, Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Project No. 728

Enclosure:
As stated

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Sincerely,

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Enclosure:
As stated

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