ENCLOSURE

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 23 1986

Mr. E. P. Rahe, Jr., Manager
Nuclear Safety Department
Westinghouse Electric Corporation
Post Office Box 355
Pittsburgh, PA 15230

Dear Mr. Rahe:

SUBJECT: Acceptance for Referencing of Licensing Topical Report WCAP 10965-P and WCAP 10966-NP

The Nuclear Regulatory Commission (NRC) has completed its review of the Westinghouse Electric Corporation licensing topical report WCAP 10965-P and WCAP 10966-NP (the non-proprietary version) both entitled "ANC - A Westinghouse Advanced Nodal Computer Code" and the responses to the NRC's request for additional information submitted by letter, E. P. Rahe, Jr. (W) to J. Lyons (NRC), number NS-NRC-86-3132, dated May 8, 1986. The report discusses the alterations made in the nodal calculation methods now embodied in the PALADON code in order to improve the agreement between nodal and fine mesh diffusion theory calculation. The technical evaluation of the licensing topical report, prepared under contract by the Brookhaven National Laboratory and concurred in by the NRC staff is enclosed.

Based on the review we conclude that the ANC code provides improved agreement with fine mesh diffusion when compared to the present nodal code and is acceptable for use in design calculation as noted in the attached technical evaluation report. We further conclude that the report WCAP-10965 may be used as a reference for the description of the code and for the definition of the uncertainties associated with its use.

We do not intend to repeat the review of the safety features described in the licensing topical report and found acceptable herewith when it appears as a reference in a license application except to assure that the material presented is applicable to the specific plant involved. Our acceptance applies only to the features described in the topical report as augmented by the responses to the request for additional information.

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The details of these improvements and their qualification are provided in WCAP-10965, and are the subject of the present review. The ANC topical report is summarized in the following section, and the technical evaluation and technical position are summarized in Sections 3 and 4, respectively.

2.0 SUMMARY OF THE TOPICAL REPORT

2.1 Methods Improvement

The methods improvements which have been incorporated in ANC are described in Chapter 2 of the report, and include (1) an accurate nodal flux solution, (2) a rod-wise power distribution capability, and (3) a more accurate cross section homogenization procedure. The nodal flux solution is described in Section 2-1 and is based on a set of two-group nodal balance equations. The nodal equations are solved iteratively subject to group dependent boundary conditions. The nodal cross section representation allows for spatial variation within the node, and includes the effects of intranodal feedback-induced heterogeneities.

The ANC determination of the assembly rod-wise power distribution is described in Section 2-2. The rod-wise power distribution is determined by multiplying a precalculated (and stored) local power distribution by an analytically determined global shape correction factor. The ANC cross section homogenization procedure is described in Section 2-3. In order to provide an improved calculation of the nodal reaction rates, a flux discontinuity factor is introduced at nodal interfaces. This factor is determined numerically and correlated as a function of fuel type and burnup.