FRAMATOME ANP

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FRAMATOME ANP, Inc.

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Document Control Desk
ATTN: Chief, Planning, Program and Management Support Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Interim Report of an Evaluation of a Deviation Pursuant to 10 CFR 21.21(a)(2)

Framatome ANP is evaluating its methodology for calculating the power peaking effects under the assumption of a fuel assembly bow. The evaluation includes a determination of whether the assumed gap size between adjacent fuel assemblies and the method of calculating the effect of this gap ensure adequate safety. For example, the use of transport theory is being compared to the NRC-approved methodology, which uses diffusion theory. Although the evaluation is still ongoing, we decided on October 13 to initiate an evaluation under the provisions of Part 21.

An interim report on the evaluation is attached, specifically: Interim Report No. 03-001, "Fuel Assembly Bow Analysis."

Those Framatome ANP customers potentially affected by this matter have been notified and will receive a copy of this interim report.

Very truly yours,

James F. Mallay, Director
Regulatory Affairs

Enclosures

cc: D.G. Holland
Project 728

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Interim Report (03-001)

Subject:

Interim Report of an Evaluation of a Deviation Pursuant to 10 CFR 21.21(a)(2)

Title:

Fuel Assembly Bow Analysis

Identification of Basic Activity:

Evaluation of adequacy of fuel assembly bow analysis for Mark-B (used in B&W-designed reactors) and Mark-BW (used in Westinghouse-designed reactors) fuel assemblies.

Basic Activity Supplied by:

Framatome ANP, Inc.

Nature of Deviation:

FANP performs fuel assembly bow analyses for Mark-B and Mark-BW fuel in accordance with an NRC-approved methodology (BAW-10147 PA, Revision 1), which was accepted in May 1983. Because analytical techniques have matured considerably since this approval and questions were raised about the appropriateness of the assumptions made, we believed it appropriate to evaluate the adequacy of this particular methodology.

The evaluation of fuel assembly bow is focused on two aspects of the analysis: the assumption of the gap size and the method used to calculate the power peaking. No conclusions have been reached regarding reportability under Part 21. The gap size assumed in the approved methodology is twice the normal, cold, design gap, which reflects the "worst case" scenario in which one fuel assembly is assumed to bow until it comes into contact with the adjacent assembly. This assumption was judged adequately conservative by the NRC in accepting the methodology, but FANP is reviewing operations experience to confirm this view.

The neutronics calculation called for in the approved methodology relies on diffusion theory. FANP recognized at the time of approval that transport theory would provide some added accuracy but believed this increased sophistication was unnecessary in view of the maximum gap assumed. This decision is being reconsidered along with the model used to simulate the fuel assembly geometry.

The deviation being evaluated consists of the assumed gap size, the use of diffusion theory (as opposed to transport theory), and the geometric model, all of which are used to determine the effect of assembly bow on the peaking factor. The purpose of the evaluation is to determine whether the overall methodology is adequately conservative, including the gap size, the calculation of neutron flux, and the geometric simulation.

Discovery Date:

October 13, 2003

Corrective Actions to Date:

Calculations have been performed to compare the power peaking that would result using transport versus diffusion theory, different geometric simulations, and varying gap sizes (based on hot and cold conditions). The preliminary results of these evaluations have been provided to affected customers. In addition, analyses were conducted that incorporated both revised assumptions on calculational techniques (neutron behavior and geometry) and known conservatisms, which tend to have offsetting effects.

The ongoing evaluation of the methodology will include additional investigations on the gap size to be assumed. In addition, the entire analytical approach, including the assumptions used (such as gap size), will be evaluated as a whole to determine whether any changes in the approved methodology are appropriate to ensure adequate safety.

Evaluation Completion Schedule Date:

December 17, 2004