FRAMATOME ANP

May 2, 2001
NRC:01:018

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

Request for Additional Information – Framatome ANP Richland, Inc. Topical Report EMF-2361(P) Revision 0, *EXEM BWR-2000 ECCS Evaluation Model*, (TAC No. MB0574)

Ref.: 1. Letter, N. Kalyanam (NRC) to J. F. Mallay (FRA-ANP), "Request for Additional Information – Framatome ANP Richland, Inc., Topical Report EMF-2361(P) Revision 0, *EXEM BWR-2000 ECCS Evaluation Model* (TAC NO. MB0574)," April 25, 2001.

In Reference 1, the NRC requested additional information to facilitate the completion of its review of the Framatome ANP Richland, Inc. topical report EMF-2361(P) Revision 0, *EXEM BWR-2000 ECCS Evaluation Model*. The response to this request is contained in the attachment to this letter.

Very truly yours,

James F. Mallay, Director
Regulatory Affairs

/arn

Attachment

cc: N. Kalyanam
R. Caruso
Project No. 702

Framatome ANP Richland, Inc.

2101 Horn Rapids Road
Richland, WA 99352

Tel: (509) 375-8100
Fax: (509) 375-8402

T010
1/1

Question:

In response to the March 5, 2001, staff request, FRA-ANP furnished the information electronically by a compact disc (CD) containing the codes RELAX, PREHUXY and HUXY, and selected test cases. The staff ran these codes in the NRC computing system to independently verify the code performance in order to reproduce some of the results presented in the subject topical report.

One large-break and one small-break loss-of-coolant accident (LOCA) test cases ran on the NRC system produced the following result:

> In both the cases, the results calculated by NRC and FRA-ANP were close (within a few degrees) in the beginning of the transients. However, after about a third of the total transient time elapsed, the results for both the test cases began to significantly diverge, resulting in peak cladding temperatures (PCT) which were approximately 65°F higher for NRC calculated small-break LOCA (SBLOCA), and approximately 10°F lower for NRC calculated large-break LOCA (LBLOCA).

The staff, therefore, requests FRA-ANP to review the test case results and explain the discrepancies, paying particular attention to the differences introduced from the results using FRA-ANP generated static executable. In addition, the staff requests you to address the following concerns:

1. What assurances are there to justify that there are no errors in the computer floating point math performance that is causing the deviations in the results?
2. Considering that the observed discrepancy is significant (PCT difference > 50°F) for one out of the two test cases, what assurances are there that the deviation will not be larger than 65°F for SBLOCA calculations, possibly in the non-conservative direction, if the staff had pursued more test case runs at NRC? Please provide the rationale for the difference and reasoning for not using the more conservative NRC calculated results (compared to the FRA-ANP calculated) for the licensing basis.

Response:

Ref 1: Letter, N. Kalyanam (NRC) to J. F. Mallay (FRA-ANP), "Request for Additional Information – Framatome ANP Richland, Inc., Topical Report EMF-2361(P) Revision 0, *EXEM BWR-2000 ECCS Evaluation Model*, (TAC NO. MB0574)," March 5, 2001.

Ref 2: Letter, J. F. Mallay (FRA-ANP) to Document Control Desk (NRC), "NRC Review of EMF-2361(P) Revision 0, *EXEM BWR-2000 ECCS Evaluation Model*," NRC:01:012, March 1, 2001.

Ref 3: Letter, J. F. Mallay (FRA-ANP) to Document Control Desk (NRC), "Response to RAI Request Number 6 for Topical Report EMF-2361(P) Revision 0, *EXEM BWR-2000 ECCS Evaluation Model*, (TAC NO. MB0574)," NRC:01:016, April 12, 2001.

The NRC requested in Reference 1 that the source code, executable, user code document, and specific input decks, one large break and one small break LOCA deck, be provided for the LOCA methodology described in EMF-2361(P). This information was provided in Reference 2.

The NRC subsequently informed Framatome ANP Richland, Inc. (FRA-ANP) that the results obtained by the NRC on their computers differed from the FRA-ANP results by the amounts stated in the above question. The FRA-ANP investigation into these differences resulted in the discovery that the code executable for RELAX, provided to the NRC in the Reference 2 transmittal, was dynamically linked and therefore relied on the system on which it was installed. FRA-ANP compiled the code RELAX in a static form and provided this version of the code in Reference 3.

It is FRA-ANP's understanding from conversations with the NRC Staff that the results from the code version supplied in Reference 3, when run on the NRC computers, produces results equivalent to those obtained by FRA-ANP. Therefore, the cause of the difference between the results obtained by FRA-ANP and those obtained by the NRC has been shown to be due to the different system routines employed by the FORTRAN compilers on those systems.

FRA-ANP believes that the fact that the NRC results and the FRA-ANP results are equivalent demonstrates that there are no errors in the computer floating point math performance on the FRA-ANP computers. Since the results obtained by FRA-ANP and the NRC are equivalent, the second concern has also been addressed.