Proj: 702 (handwritten)

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June 12, 2001
NRC:01:024

Document Control Desk
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Washington, D.C. 20555-0001

10 CFR 50.46 Report of a SBLOCA Model Error Correction

Ref.: 1. EMF-2328(P)(A), *PWR Small Break LOCA Evaluation Model, S-RELAP5 Based*, Framatome ANP Richland, Inc., March 2001.

Ref.: 2. XN-NF-81-58(P)(A) Revision 2 Supplements 1 & 2(P)(A) Revision 2, *RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model*, Siemens Power Corporation, March 1984.

Ref.: 3. ANF-81-58 (P)(A) Revision 2 Supplements 3&4, *RODEX2 Fuel Rod Thermal Mechanical Response Evaluation Model*, Siemens Power Corporation, April 1990.

Ref.: 4. XN-NF-82-49(P)(A) Revision 1 Supplement 1, *Exxon Nuclear Co. Evaluation Model Revised EXEM PWR Small Break Model*, Siemens Power Corporation, October 1994.

The NRC-approved PWR Small Break LOCA methodology (Reference 1) uses a number of fuel mechanical models from the RODEX2 computer code (References 2 and 3) in S-RELAP5. The formulation used for clad thermal expansion in RODEX2 is a low temperature steady state Alpha phase formulation. This formulation is acceptable for the cladding temperatures encountered in the standalone RODEX2 calculations; however, in S-RELAP5 substantially higher cladding temperatures are expected. It is possible for cladding temperatures in the S-RLEAP5 SBLOCA analyses to be high enough to cause an Alpha to Beta phase change in the cladding. If this phase change occurs, the RODEX2 formulation for cladding thermal expansion may overpredict the cladding expansion (since the Beta phase expands less than the Alpha phase), which would lead to an overprediction of gap width and an underprediction of rod internal pressure.

A version of S-RELAP5 was created that incorporates the MATPRO-10 phase dependent formulation for cladding thermal expansion. Using this new version, the limiting SBLOCA sample problem from Reference 1 was re-run. Correcting the clad thermal expansion increases the PCT by about 4°F.

Framatome ANP Richland, Inc.

Since the S-RELAP5 code error will be corrected prior to performing any plant calculations with the Reference 1 methodology, Framatome ANP's customers will not be reporting this correction under the provisions of 10 CFR 50.46. Framatome ANP is reporting this modification directly to the NRC to satisfy the intent of this regulation.

The previously approved SBLOCA methodology (Reference 4) uses TOODEE2 to predict cladding temperature. This code incorporates a cladding thermal expansion model that adequately simulates the phase change. Therefore none of the current SBLOCA analyses used by Framatome ANP is affected by this error correction.

Very truly yours,

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    Project No. 702