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Project 717

MFN 03-102
September 19, 2003

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20852-2738

Attention: Chief, Information Management Branch
Program Management
Policy Development and Analysis Staff

Subject: **Response to Request for Additional Information (RAI) number 56 for ESBWR Pre-application Review.**

GE Nuclear Energy is submitting, in enclosures 1, response to NRC RAI number 56, which was included in the referenced letter.

If you have any questions about the information provided here, please let me know.

Sincerely,

Atambir S. Rao

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Reference:

1. MFN 03-052, Letter From Amy E. Cubbage (NRC) To Atam S. Rao (GE), June 20, 2003, SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 4 RELATED TO ESBWR PRE-APPLICATION REVIEW (TAC NOS. MB6283 AND MB6801)

Enclosures:

1. MFN 03-102 Response to NRC RAI number 56 - Non-proprietary Information

cc:	A. Cubbage	USNRC (with enclosure)
	J. Lyons	USNRC (w/o enclosure)
	G.B. Stramback	GE (with enclosure)

ENCLOSURE 1

MFN 03-102

Response to NRC RAI numbers 56

Q56. Section 6.5.4.1 (annular flow regime) - Why is the heat transfer coefficient modified on the liquid side?

R56. The heat transfer on the liquid side is not modified; it is calculated from the conduction across a thin liquid film and is given by Equation 6.5-18 in NEDE-32176P. The heat transfer on the vapor side is based on a modification to the model developed by Theofanous. The original model as developed by Theofanous is given by:

$$St=0.02\sqrt{\frac{L}{D}}$$

In TRAC-PF1/MOD1 the model was modified by removing the shape factor term:

$$St = 0.02 = \frac{h}{\rho C_p v}$$

The justification is given in Section 4.1.1 of NUREG/CR-5069. The justification considers that a constant Stanton number falls within the range of the available data. This model was carried over to other TRAC versions including TRACG. The final justification for the use of this model is based on the qualification in NEDE-32177P. The vapor side heat transfer coefficient for annular flow is only significant for conditions where significant vapor super heat is present. Qualifications against test data for such conditions are contained in Sections 3.2, 5.1 and 5.2 of NEDE-32177P.