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U.S. Nuclear Regulatory Commission
Washington DC 20555-0001

Attention: Theodore E. Quay, Director
Standardization Project Directorate

Subject: SBWR - Non-Proprietary Version of RAI Responses Submitted April 29, 1994

Reference: 1. Letter from Dino C. Scaletti (NRC) to Mr. James E.Quinn (GE), Request for Withholding Information From Public Disclosure, General Electric (GE) Responses to Request for Additional Information (RAI) Dated April 29, 1994, dated August 11, 1995.

2. Letter MFN 062-94 from P. W. Marriott (GE) to Richard W. Borchardt (NRC), NRC Requests for Additional Information (RAIs) on the Simplified Boiling Water Reactor (SBWR) Design, dated April 29, 1994.

In response to the NRC's Reference 1 request, GE is providing the attached non-proprietary version of Reference 2.

Sincerely,

James E. Quinn

cc: P. A. Boehnert (NRC/ACRS) (2 paper copies plus E-Mail)
I. Catton (ACRS) (1 paper copy plus E-Mail)
A. Drozd (NRC) (1 paper copy plus E-Mail)
S. Q. Ninh (NRC) (2 paper copies plus E-Mail)
D. C. Scaletti (NRC) (1 paper copy plus E-Mail)
J. H. Wilson (NRC) (1 paper copy plus E-Mail)

D403

pls: D. Hooker

RAI Number: 950.38

Question:

Supplement the response to Q950.13 (transmitted in GE letter MFN No. 167-93 dated October 19, 1993) regarding core flow-dependent loss coefficients by providing the exact locations and corresponding loss coefficients of the spacers in the rod bundble.

GE Response:

The diagram 11D6261 Rev. OERM provided by Reference 2* locates the spacers. The dimensionless loss coefficient of the spacers was provided in the response to RAI 950.13. Each of the 5 spacers has that same loss coefficient.

* Refers to Reference 2 of the transmittal letter to this non-proprietary version of the RAI response.

RAI Number: 950.40

Question:

Supplement the response to Q950.14 (transmitted in GE letter MFN No. 167-93 dated October 19, 1993) regarding the feedwater pump by providing the following additional information:

a. Feedwater pump head
b. Booster pump head
c. Total liquid volume of the condenser
d. Total volume of the condenser
e. Rated feedwater pump speed
f. Fraction of extraction steam to feedwater heaters
g. Feedwater pump inertia
h. Rated and maximum flow capacity of feedwater pump
i. Total Number of feedwater heaters
j. Delay time for feedwater pump trip
k. Delay time for feedwater heater failure

GE Response:

The following information is provided regarding the Feedwater (FW) pump:

a. FW pump head

100% flow (see heat balance in SSAR for rated 100% FW flow) at 7.444 MPa vessel dome pressure.

Slope of flow with pressure is <29.0%/MPa and >14.5%/MPa

b. Booster pump head

c. Condenser Liquid volume

d. Total volume of the condenser

e. Rated FW pump speed

b, c, d, and e are design details not necessary for the safety analysis provided in the SSAR and not specified or known at this stage of the Project.

In characterizing FW system dynamics, rather than a force balance on the pump using items e and g, etc., the ODYNV FW dynamic model is applied. This model has been accepted by the NRC for application to BWR's. The model is described in NED-31528, ODYNV08 user manual". The figure attached to Reference 2* shows the portion of the FW dynamics used in the GE model which characterizes the mechanical parts of the FW

* Refers to Reference 2 of the transmittal letter to this non-proprietary version of the RAI response.

system, starting with a control system demand, V(166) and ending with a FW pump flow, V(167) at rated pressure. The pressure correction of a. above is applied, and a coastdown multiplier (F(161) see j provided by Reference 2*) is applied.

f. Fraction of extraction steam

See Heat Balance Figures 10.1-2 and 10.1-3 in the SSAR.

g. Pump inertia
Design detail is not necessary for safety analysis provided in the SSAR and not specified or known at this stage of the Project. See ODYNV FW dynamics above.

h. FW capacity
For transient analysis: minimum 155% maximum 180%

i. Total Number of FW heaters: 6

j. Delay time for FW trip

Loss of power: Coastdown multiplier on V167, linear reduction in multiplier (F(161)) from 1 to 0 over 5 seconds. Sensitivity studies were done with 30 second coastdown.

Anticipated Transient Without Scram (ATWS): See SBWR TRACG Application Methodology NEDE-31178P Figure 4-2 for ATWS FW demand reduction. This logic acts as a multiplier on V(166)

Loss of Coolant Accident (LOCA): Linear reduction from initial flow over 5 seconds.

LOCA Containment Analysis: Because it would be non-conservative to assume a 5 second reductions of flow in the containment analysis, the enthalpy in the FW heaters is conservatively included and thereby increases the energy and volume of FW added. This is necessary only for LOCA containment pressure and temperature calculations.

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* Refers to Reference 2 of the transmittral letter to this non-proprietary version of the RAI response.

k. FW heater failure delay time.

The time constant of a FW heater on loss of extraction steam used in transient analysis is 60 seconds.

In addition there is approximately 350 cubic feet of feedwater piping in the SBWR between the heaters and the vessel which further delays introduction of the colder water.

Note that the NRC approved application of the GE 3D core simulator (PANACEA) is applied to the loss of feedwater heater analysis, in which the worst transient condition is applied in a steady state PANACEA calculation. The time constant is not applied in PANACEA. This is the same as has been repeatedly approved by the NRC for ABWR and Operating Plants.