GE Energy

James C. Kinsey
Project Manager, ESBWR Licensing

PO Box 780 M/C J-70
Wilmington, NC 28402-0780
USA

T 910 675 5057
F 910 362 5057
jim.kinsey@ge.com

MFN 07-277

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U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **NRC Request for Design Information in Containment Fragility Audit February 5-7, 2007**

During the subject audit, the NRC requested that GE provide the following design information:

> For the containment structural components: Wetwell, Upper Drywell, Lower Drywell (reactor Pedestal), Suppression Pool Slab, Basemat, Drywell Head and PCCS heat exchangers, provide the following design data for design pressure of 0.31MPa: 1) identify the critical section that has the largest ratio of calculated stress / code allowable limit, 2) provide the ratios, and 3) the allowable limit used.

GE's response is provided in Enclosure 1.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

D068

Enclosure:

1. MFN 07-277 – Response to NRC Request for Design Information in Containment Fragility Audit, February 5 – 7, 2007

cc:

AE Cubbage	USNRC (with enclosures)
DH Hinds	GE (with enclosures)
RE Brown	GE (w/o enclosures)
eDRF	0000-0066-1384

ENCLOSURE 1

MFN 07-277

Response to NRC Request for Design Information in

Containment Fragility Audit

February 5-7, 2007

NRC Request

For the containment structural components: Wetwell, Upper Drywell, Lower Drywell (reactor Pedestal), Suppression Pool Slab, Basemat, Drywell Head and PCCS heat exchangers, provide the following design data for design pressure of 0.31MPa: 1) identify the critical section that has the largest ratio of calculated stress / code allowable limit, 2) provide the ratios, and 3) the allowable limit used.

GE Response

The design data for various containment structural components at 0.31 MPa design pressure are presented in the tables below. The stress or strain ratio is obtained to be the calculated value divided by the code allowable limit. The effect of design temperature on the material strength is considered in the code allowable limit.

Table 1 Critical Section for Maximum Rebar Stress (0.31MPa+Dead Load)

Location	Max rebar stress ratio	Factored Load Allowable (MPa)	Corresponding concrete stress ratio	Corresponding liner strain ratio
Upper Drywell	0.22	357.4	0.17	0.0333
Wetwell	0.21	361.1	0.22	0.0333
Lower Drywell	0.20	357.4	0.13	0.04
Basemat	0.09	368.5	0.06	0.02
Suppression Pool Slab	0.23	361.1	0.21	0.04
Topslab	0.45	349.9	0.21	0.02

Table 2 Critical Section for Maximum Concrete Stress (0.31MPa+Dead Load)

Location	Max concrete stress ratio	Factored Load Allowable (MPa)	Corresponding rebar stress ratio	Corresponding liner strain ratio
Upper Drywell	0.21	-23.6	0.15	0.0333
Wetwell	0.22	-24.5	0.21	0.0333
Lower Drywell	0.22	-24.1	0.08	0.0667
Basemat	0.07	-20.5	0.09	0.02
Suppression Pool Slab	0.27	-24.5	0.17	0.04
Topslab	0.24	-24.1	0.27	0.0667

Table 3 Critical Section for Maximum Liner Strain (0.31MPa+Dead Load)

Location	Max liner strain ratio	Factored Load Allowable	Corresponding rebar stress ratio	Corresponding concrete stress ratio
Upper Drywell	0.0667	0.003	0.19	0.04
Wetwell	0.06	-0.005	0.20	0.02
Lower Drywell	0.133	0.003	0.17	0.15
Basemat	0.02	-0.005	0.08	0.05
Suppression Pool Slab	0.0667	0.003	0.18	0.003
Topslab	0.0667	0.003	0.20	0.11

Table 4 Critical Section for Drywell Head (0.31MPa+Dead Load)

Location	Max stress ratio	Service Level C Allowable (MPa)
Sleeve/Head	0.193	342
Bolted Flange	0.212	151
Flange Bolt	0.499	439
Anchor (Flange Plate)	0.249	342
Anchor (Gusset Plate)	0.211	342
Concrete	0.211	17.1

Table 5 Critical Section for PCCS Heat Exchangers (0.31MPa)

Location	Max stress ratio	Service Level C Allowable (MPa)
Header Cover	0.215	165