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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 67 Related to ESBWR Design Certification Application – Reactor Internal Structures – RAI Number 3.9-149**

Enclosure 1 contains GE's response to the subject NRC RAI transmitted via the Reference 1 letter.

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

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Reference:

1. MFN 06-378, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 67 Related to ESBWR Design Certification Application,* October 10, 2006

Enclosure:

1. MFN 07-238 – Response to Portion of NRC Request for Additional Information Letter No. 67 Related to ESBWR Design Certification Application – Reactor Internal Structures – RAI Number 3.9-149

cc:

AE Cubbage	USNRC (with enclosures)
DH Hinds	GE (with enclosures)
RE Brown	GE (w/o enclosures)
eDRF	0000-0066-7390

Enclosure 1

MFN 07-238

Response to Portion of NRC Request for

Additional Information Letter No. 67

Related to ESBWR Design Certification Application

Reactor Internal Structures – RAI Number 3.9-149

NRC RAI 3.9-149

Table 3.9-4 of the DCD, Tier 2, provides deformation limits for safety class reactor internal structures. GE is requested to provide the technical basis for the General Limits listed in the table.

GE Response

The deformation limit of $0.9/ SF_{min}$ given in Table 3.9-4 a. of DCD, Tier 2 is determined as follows:
Per the ASME Code, Section II, Part D, Appendix I, the allowable stress intensity value, S_m, for austenitic stainless steel is 90% of minimum yield strength at temperature. Based on experimental data from the industry, the minimum strain, ε, before yield of irradiated stainless steel is selected. Using these values and considering the minimum safety factors, SF_{min}, from Chapter 3.9.5.4 of DCD, Tier 2, the maximum permissible deformation can generally be specified as:

$$(P + Q)/E \leq 0.9/ SF_{min} \cdot \varepsilon$$

Where:

P = Primary stress
Q = Secondary stress
E = Young's modulus
ε = minimum strain before yield

For ASME III, Service Level A and B loads, the maximum permissible deformation with $SF_{min} = 2.25$ would be:

$$(P + Q)/E \leq (0.9/2.25) \cdot \varepsilon = 0.4 \cdot \varepsilon,$$

likewise:

$$(P + Q)/E \leq (0.9/1.5) \cdot \varepsilon = 0.6 \cdot \varepsilon \quad \text{for Service Level C loads}$$

and

$$(P + Q)/E \leq (0.9/1.125) \cdot \varepsilon = 0.8 \cdot \varepsilon \quad \text{for Service Level D loads}$$

These maximum permissible deformation limits and the minimum strain value, ε, are specified in the reactor internals design specification.

When experimental data from the actual material are used, the general deformation limit $1.00/ SF_{min}$ as shown in Table 3.9-4 b. may be used.

DCD Impact

No DCD changes will be made in response to this RAI.