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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 67 Related to ESBWR Design Certification Application – Mechanical Systems and Components – RAI Numbers 3.9-89 and 3.9-143.**

Enclosure 1 contains GHNEA's response to the subject NRC RAIs 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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NRO

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

Enclosure:
1. MFN 07-308, Response to Portion of NRC Request for Additional Information Letter No. 67 Related to ESBWR Design Certification Application – Mechanical Systems and Components – RAI Numbers 3.9-89 and 3.9-143.

cc: AE Cubbage USNRC (with enclosures)
GB Stramback GHNEA/San Jose (with enclosures)
BE Brown GHNEA/ Wilmington (with enclosures)
eDRF 0000-68-3035

Enclosure 1

MFN 07-308

Response to Portion of NRC Request for

Additional Information Letter No. 67

Related to ESBWR Design Certification Application

Mechanical Systems and Components

RAI Numbers 3.9-89 and 3.9-143

NRC RAI 3.9-89

It is not clear from the discussion in DCD Tier 2, Section 3.9.2.5 which subassemblies of the reactor internals experience the highest stress, deformation or fatigue under the faulted condition loadings. Therefore, the applicant is requested to identify the locations in the reactor internals where the stress,deformation and fatigue are determined to be highest. Also identify the corresponding loading combination.

GE Response

The magnitude and locations of the highest stresses, deformations and fatigue usage in the Reactor Internal Structures will be determined in the detailed design analysis. The Certified Design Specification for the Core Support Structures requires the components be analyzed in detail to meet the requirements of the ASME Code, Section III, Subsection NG using the loads and loading combinations described in Section 3.9.2.5 of the DCD, Tier 2.
As for the deformations of the Core Structure Components due to faulted condition loads, the Certified Design Specification will specify the maximum permissible displacements of the Top Guide, Core Plate, Shroud and CRD Guide Tubes to ensure safe insertion of the control rods.

DCD Impact

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

NRC RAI 3.9-143

In Section 4.1.2.2 of the DCD Tier 2, GE stated that individual fuel assemblies in groups of four rest on orificed fuel supports that are mounted on top of the control rod guide tubes (CRGT). Each guide tube, with its orificed fuel support, bears the weight of four fuel assemblies and is supported on a CRD Housing (CRDH) penetration nozzle in the bottom of the reactor vessel. It appears that the weld at the nozzle is subjected to the weight of four fuel assemblies, orificed fuel support, CRGT and CRDH, and other vertical and horizontal loads. GE is requested to clarify the load path and ensure the weld at the nozzle is adequate to accommodate these loads. In the event of weld failure, GE is requested to assess the adequacy of the CRGT and the CRDH subjected to flow-induced vibrations, and the ability to insert the control rod, considering the boundary conditions at the top of the CRGT and failed weld, and the CRGT base coupling connection with the CRDH.

GE Response

The CRD housing - to - CRD Stub Tube weld in the bottom head of the reactor pressure vessel carries the deadweight of four fuel assemblies, the orificed fuel support and the CRD guide tube. In addition, the weld carries the loads due to seismic and hydrodynamic accelerations as well as scram reaction loads, spring loads and vibratory loads. The load path is identical to that of earlier BWRs including the ABWR. A sketch of the CRD penetration was included in GE's response to RAI 4.5-19. The weld is analyzed, designed, manufactured and examined to be in full compliance with the requirements for ASME Code, Section III, Division 1, Class 1 pressure retaining components considering all the loads mentioned in the foregoing.

The clearance between the CRD housing is controlled and kept as small as practicable for installation purposes. Thus, in the unlikely event of a complete weld failure, the transversal movement of the CRD Housing and the CRD Guide Tube is limited. Flow induced vibration during this hypothetical condition would produce stresses in the CRD Guide Tube that are within the endurance limit as defined using the fatigue curve for austenitic stainless steel, Figure I-9.2.1 of the ASME Code, Section III.

A complete failure of the CRD housing - to - CRD Stub Tube is very unlikely. The existence of weld cracks in some older plants were discovered by leakage through the weld. The leakage started long in advance of any possibility of a complete weld failure. Also, the use of Columbium stabilized Alloy 82 weld material and Ni-Cr-Fe Alloy 600 stub tube material per ASME Code Case N-580-1 in the ESBWR has widely eliminated the concern for stress corrosion cracking in the weld and adjacent material.

As mentioned in the foregoing, in the case of a complete weld failure, the transverse movement of the CRD Guide Tube is limited. The control rods and the control drive are designed to accommodate this misalignment during insertion of the control rods.

DCD Impact

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