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Supplement 6

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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 67 Related to ESBWR Design Certification Application – Design Of Structures, Components, Equipment, and Systems - RAI Number 3.9-150 S01**

Enclosure 1 contains GEH's response to the subject NRC RAI transmitted via e-mail on May 10, 2007. GE's original response was provided in the Reference 1 letter.

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

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

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Reference:

1. MFN 06-464, Letter from David Hinds to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 67 Related to ESBWR Design Certification Application –DCD Section 3.9 – RAI Numbers 3.9-4 through 3.9-11, 3.9-17, 3.9-18, 3.9-23, 3.9-26, 3.9-27, 3.9-29, 3.9-32, 3.9-34 through 3.9-36, 3.9-38 through 3.9-40, 3.9-44, 3.9-46 through 3.9-55, 3.9-57, 3.9-59, 3.9-60, 3.9-67, 3.9-72 through 3.9-76, 3.9-79, 3.9-80, 3.9-91 through 3.9-94, 3.9-96 through 3.9-99, 3.9-101, 3.9-102, 3.9-104, 3.9-105, 3.9-108, 3.9-110, 3.9-132, 3.9-140, 3.9-142, 3.9-147, 3.9-150, 3.9-151, and 3.9-153, dated November 22, 2006*

Enclosure:

1. MFN 06-464. Supplement 65 - Response to Portion of NRC Request for Additional Information Letter No. 67 Related to ESBWR Design Certification – Design of Structures, Components, Equipment, and Systems - RAI Number 3.9-150 S01

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eDRF 0000-0074-4140

Enclosure 1

MFN 06-464, Supplement 6

Response to Portion of NRC Request for

Additional Information Letter No. 67

Related to ESBWR Design Certification Application

Design of Structures, Components, Equipment, and Systems

RAI Number 3.9-150 S01

NRC RAI 3.9-150

Since there will be no preoperational FIV testing of the ESBWR because it operates in a natural recirculation mode (as noted in Section 3.9.2.4 of the DCD, Tier 2), GE is requested to discuss how the FEM's computed natural vibration modes (vibration predictions) of the reactor internal components will be correlated with test data, as specified in SRP Section 3.9.5, Draft Revision 3, April 1996, and SRP Section 3.9.2, Draft Revision 3, April 1996, Item 4.

GE Response

Prior to startup testing of reactor internal components, finite element models (FEM) of the reactor internal components to be tested are made. Using these FEMs, the natural frequencies and their corresponding mode shapes are computed by using computer programs for eigenvalue extraction. For each of these mode shapes, their locations of maximum displacement and maximum stress intensity are identified. For each accelerometer used during startup testing, and for each natural mode, the modal acceleration at the sensor location, the maximum modal acceleration, and the maximum modal stress intensity are identified. Based on this information, the vibration acceptance criteria for all accelerometers and all natural modes of interest are developed. A similar process is used for developing the acceptance criteria for strain gages. At the beginning of the startup test program for the first ESBWR, impact tests are performed to assess the acceptability of the information generated by the FEM. These impact tests are performed on instrumented components with an open reactor vessel under ambient conditions. The impact test results, including all natural frequencies and natural modes of interest, are compared to the FEM results using ambient condition fluid and structural properties. The results of the comparisons are used to refine the FEM if deemed appropriate.

DCD Impact

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

NRC RAI 3.9-150 S01

RAI 3.9-150 S01 Comment on response to RAI 3.9-150 (MFN 06-464):

In its response to NRC RAI 3.9-150, dated November 22, 2006, the applicant explains that prior to startup testing, finite element models of the reactor internal components will be constructed and analyzed for their natural frequencies and mode shapes. Dynamic acceptance criteria for all accelerometers and strain gages to be placed on the components will be developed based on the FE model results. Also prior to startup, impact tests will be conducted on all instrumented components with an open reactor vessel at ambient conditions. The test results will be used to guide FE model revisions if they are deemed necessary.

The applicant's response states that impact tests will be performed for the first ESBWR. As a supplemental RAI, the applicant is requested to address impact tests for the first and subsequent ESBWR plants in the DCD.

GEH Response

The following response applies to reactor internal components other than the steam dryer. Hammer tests of the steam dryer are addressed in RAI 3.9-137.

The objective of the first ESBWR reactor internals hammer tests is to identify the natural frequencies, mode shapes and modal damping of the components of interest. The natural frequencies and mode shapes will be compared with those calculated using finite element models. If the calculated natural frequencies and mode shapes are significantly different from those obtained from the hammer test, then the finite element models will be refined such that the natural frequencies and mode shapes are in better agreement. The hammer test results will also serve as a verification that the finite element models represent the ESBWR components realistically.

For ESBWR's subsequent to the first, no hammer tests are planned. This is because it is anticipated that the design of the subsequent ESBWR's will be identical to that of the first ESBWR. Thus, except for minor manufacturing tolerances, the ESBWR internal components of the first and subsequent ESBWR's will be identical. Therefore, the modal characteristics of the first and subsequent ESBWR's will be essentially identical and no hammer tests are required.

DCD Impact

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