

March 22, 2006

Mr. David H. Hinds, Manager, ESBWR  
General Electric Company  
P.O. Box 780, M/C L60  
Wilmington, NC 28402-0780

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 14 RELATED TO  
ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Hinds:

By letter dated August 24, 2005, General Electric Company (GE) submitted an application for final design approval and standard design certification of the economic simplified boiling water reactor (ESBWR) standard plant design pursuant to 10 CFR Part 52. The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed design.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the attachment to this letter. This RAI concerns ESBWR design control document (DCD) Tier 2, Section 5.3, "Reactor Vessel." These questions were sent to you via electronic mail on February 13 and 26, 2006, and were discussed with your staff during a telecon on March 17, 2006. You agreed to respond to these RAIs by April 21, 2006.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-2875 or [aec@nrc.gov](mailto:aec@nrc.gov), or Larry Rossbach at (301) 415-2863 or [lwr@nrc.gov](mailto:lwr@nrc.gov).

Sincerely,

***/RA/***

Amy Cabbage, Senior Project Manager  
New Reactor Licensing Branch  
Division of New Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 52-010

Attachment: As stated

cc: See next page

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Amy Cubbage, Senior Project Manager  
New Reactor Licensing Branch  
Division of New Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 52-010

Attachment: As stated

cc: See next page

ACCESSION NO. ML060790453

OFFICE	NRBA/PM	NRBA/BC
NAME	ACubbage	LDudes
DATE	03/21/2006	03/21/2006

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**Requests for Additional Information (RAIs)  
ESBWR Design Control Document (DCD), Tier 2, Section 5.3**

RAI Number	Reviewer	Summary	Full Text
5.3-1	Ray N	Use of non-L and L grade types 304 and 316 stainless steel materials in instrumentation nozzles and drain nozzles.	The applicant stated in DCD Table 5.2-4 that both non-L and L grade types 304 and 316 stainless steel materials will be used for instrumentation nozzles and drain nozzles. Previous experience indicates that 304/316 (non-L grade) stainless steel materials are prone to intergranular stress corrosion cracking (IGSCC) when exposed to boiling water reactor (BWR) reactor coolant system (RCS) water. Therefore, staff requests that the applicant justify the use of non-L grade stainless steel materials for reactor vessel (RV) components that are potentially exposed to the BWR RCS water.
5.3-2	Ray N	Selection of appropriate welding electrodes for the fabrication of bottom head penetrations.	The applicant stated that it will use machine/manual welding processes for bottom head penetrations. If the manual welding process, i.e., shielded metal arc welding (SMAW) is used, either 182 or 152 electrode can be used. Previous experience indicates that 182 welds are prone to IGSCC when they are exposed to the BWR RCS water. Therefore, the staff requests that the applicant provide more details in regards to the selection of appropriate welding electrodes for the fabrication of bottom head penetrations so that these welds are less prone to IGSCC. If the bottom head penetrations are to be fabricated with machine welding process provide information regarding the selection of welding wire.

RAI Number	Reviewer	Summary	Full Text
5.3-3	Ray N	Issue related RV assembly at plant site.	<p>Per DCD Tier 2, Table 5.3-3, the nominal height from the inside of the bottom head (elevation zero) to the inside of the top head is 27.56 m (90.4 ft). The maximum corresponding height of a current BWR vessel is 21.9 m (71.8 ft). It is the staff's understanding that the vessel will be assembled at the site. Please provide a discussion of the following:</p> <ul style="list-style-type: none"> <li>• Final vessel assembly at the plant site is a unique concept which is quite unprecedented. Provide a detailed discussion of the planned process.</li> <li>• If a localized heat treatment of the vessel circumferential welds are used for stress relieving, please discuss the analytical techniques that may be used to address the effect of stress distribution around the heat treated areas.</li> </ul>
5.3-4	Ray N	Analysis of RV surveillance capsules/holders.	<p>Regarding the reactor vessel (RV) surveillance capsules/holders, define the surveillance capsule lead factors and azimuthal locations in the DCD. Alternatively, add a combined operating license (COL) action item specifying that this information will be submitted in the COL application.</p>
5.3-5	Ray N	Effects of temperature on embrittlement of RV materials.	<p>Because temperature affects the neutron embrittlement of the materials, provide information on the operating temperature of the vessel. If the vessel operates at a temperature below 274 EC (525 EF), discuss the effects of temperature on embrittlement of RV materials. Please revise DCD Tier 2, Section 5.3.1.6.1 to include this information.</p>

RAI Number	Reviewer	Summary	Full Text
5.3-6	Ray N	Pressure-temperature (P/T) limit calculations.	<p>Provide information regarding the derivation of the pressure-temperature (P/T) limit curves provided in the DCD. Identify any deviations from the recommended calculational procedures in Revision 1, July 1981, of Section 5.3.2 of the Standard Review Plan (SRP), and confirm conformance with Appendix G to 10 CFR Part 50.</p> <p>Clarify the intent of the P/T limit curves provided in the DCD (e.g., representative or bounding).</p>
5.3-7	Ray N	Use of plant specific data for P/T limits.	<p>The applicant stated that the P/T limit curves for the RV will be provided by the COL applicant. The staff requests that the applicant commit, in the ESBWR DCD, that P/T limits will be generated using plant-specific data (materials, fluence etc). Also, please clarify if the P/T limit curves will be submitted by the COL applicant or holder.</p>
5.3-8	Ray N	Surveillance capsule data for plant specific use.	<p>The DCD indicates that the results of the material surveillance program will be used for the development of P/T limit curves. Please verify that the material surveillance program data that will be used for recalculating these curves is the plant-specific/integrated surveillance capsule program data obtained by the COL.</p>

RAI Number	Reviewer	Summary	Full Text
5.3-9	Lois L	Dosimetry Measurements	<p>DCD Section, Tier 2, Section 5.3.1.6.5, "Time and Number of Dosimetry Measurements" states that "once the fluence to thermal power output is verified, no further dosimetry is considered necessary because of the linear relationship between fluence and power output." Please address the following:</p> <p>(a) This statement violates the provisions of Appendix H to 10 CFR Part 50.</p> <p>(b) The statement is true only for equilibrium operation that would exclude the first two cycles and other cycles following fuel vendor changes or future power uprates. Does Figure 4.3-1 indicate that ESBWR power distribution in the outer assemblies may not allow future power uprates?</p> <p>(c) If archival material is to be irradiated (per Appendix H to 10 CFR Part 50) is there not going to be associated dosimetry?</p> <p>(d) Please identify the dosimeter compliment you propose to use in the ESBWR. Will all dosimeters have an unobstructed view of the core and provide a full spectrum coverage?</p>
5.3-10	Lois L	Use of RG 1.2	DCD Section 5.3.3 refers to RG 1.2 regarding reactor pressure vessel thermal shock. However, RG 1.2 was withdrawn in 1991. Please reference another guide in the DCD.
5.3-11	Lois L	Typo	DCD Section 5.3.3.1 regarding reactor vessel failure probability should read $1 \times 10^{-6}$ per <u>reactor</u> year.
5.3-12	Lois L	Table 5.3-4 fluence values	In DCD Table 5.3-4, please add the peak inside surface fluence and its corresponding azimuthal location. Please state how the 1/4T values were derived, i.e. using the RG 1.99 formula or by direct calculation?

ESBWR

cc:

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