

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. 12 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 missile protection, Section 3.5 of the ESBWR design control document. Questions 3.5-1 through 9 of this RAI were sent to you via electronic mail on February 1, 2006, and were discussed with you during a telecon on March 3, 2006. Questions 3.5-10 through 14 of this RAI were sent to you via electronic mail on February 19, 2006, and were discussed with you during a telecon on March 7, 2006. You agreed to respond to this RAI by April 14, 2006.

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

Sincerely,

**/RA/**

Lawrence Rossbach, Project Manager  
New Reactor Licensing Branch  
Division of New Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 52-010

Enclosure: As stated

cc: See next page

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ACCESSION NO. ML060750246

OFFICE	NRBA/PM	NRBA/BC
NAME	LRossbach	LDudes
DATE	03/17/2006	03/21/2006

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Distribution for DCD RAI Letter No. 12 dated March 22, 2006

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Request for Additional Information - Chapter 3.5 of the ESBWR Design Control Document (DCD)

RAI Number	Reviewer	Question Summary	Full Text
3.5-1	Guo J	Provide additional information on missile selection criteria.	DCD Section 3.5.1 describes the criteria for missile protection inside the reactor building and lists systems requiring missile protection. However, the information provided is not sufficient for the staff to determine their acceptability. Please (1) provide information on missile protection for the systems classified under regulatory treatment of non-safety systems (RTNSS), such as fuel and auxiliary pool cooling system, (2) explain why the reactor water cleanup system (RWCU) is not listed as requiring missile protection for its reactor coolant pressure boundary and shutdown cooling functions, and (3) confirm that a single active failure concurrent with postulated internally generated missiles has been properly assumed in the selections.
3.5-2	Guo J	Provide design information on how the various pipe fittings were screened.	DCD Section 3.5.1.1.2.2 analyzed the remaining pressurized components considered to be potentially capable of producing missiles. However, the information is not sufficient to determine their acceptability. Please provide information on how the various pipe fittings were screened to determine those that could credibly become missiles.
3.5-3	Guo J	Discuss the potential for a guillotine break of a high-energy line outside containment to become a missile source.	DCD Section 3.5.1.1.2.2 states that piping failures do not form missiles because the whipping section remains attached to the remainder of the pipe. However, a guillotine break of a high-energy line could cause the pipe attachments to become a missile source. DCD Section 3.6 discusses the dynamic effects related to jet impingement forces and pipe whipping, but missile generation was not considered. Discuss the potential for a guillotine break of a high-energy line outside containment to become a missile source.

3.5-4	Guo J	Provide an assessment of potential gravitational missiles generated outside the containment.	DCD Section 3.5.1.1.1.3 discusses other missile analyses. However, gravitational missiles are not addressed in this section. Provide an assessment of potential gravitational missiles generated outside containment and explain plant design features that could prevent the impact of a falling object on safety-related equipment necessary to achieve a safe shutdown.
3.5-5	Guo J	Explain how protection from external missiles is provided for the blowout panel openings.	DCD Section 3.5.1.1.2.2.6 states that blowout panels are hinged to prevent them from becoming missiles. Explain how protection from external missiles is provided for safety-related components located near the openings of the swing-type blowout panels.
3.5-6	Guo J	Discuss how the failure of explosive squib valve were evaluated and provide design information to show that this type of valve will not become a credible missile source.	Squib valves are seldom used in operating nuclear plants such that the reliability of the valve is not traceable through plant operating experience. Discuss how the failure of explosive squib valves were evaluated, both an initiating event and at time of actuation demand, to verify that potential missiles could not damage surrounding safety-related components such that a safety function would not be threatened. If used as a basis for the evaluation, provide design information to show that this type of valve will not become a credible missile source.
3.5-7	Guo J	Discuss the possibility of the safety-relief valves becoming internally generated missiles.	Safety-relief valves (SRVs) used in ESBWR design function as safety valves and open to prevent nuclear system over-pressurization and are self-actuating by inlet steam pressure. Discuss the possibility of the safety-relief valves becoming internally generated missiles, and provide basis to determine that these components will not credibly affect safety-related equipment needed for safe shutdown.
3.5-8	Guo J	Explain whether the tornado missile threat is considered concurrent with a loss-of-offsite-power.	DCD Section 3.5.1.4 states that the design basis tornado and tornado missile spectrum are defined in DCD Sections 2.3.1, 2.3.2, and Table 2.0-1 in the design of Seismic Category I buildings. In considering tornado-generated missile threat to plant safety-related SSCs, explain whether the missile threat is considered concurrent with a loss-of-offsite-power.

3.5-9	Guo J	In addition to tornado missiles, please address the potential for other extreme winds.	DCD Section 3.5.1.4 states “because tornado missiles are used in the design basis, it is not necessary to consider missile generated from other natural phenomena.” This statement may not be true. Wind driven missiles generated by other site specific extreme winds should be considered on a case by case basis if they are considered credible. Please address the potential for other extreme winds more fully.
3.5-10	Tsao J	Submit the turbine system maintenance program with the COL application.	In DCD Section 3.5.1.1.1.2, it is stated that the COL holder shall submit for NRC approval, within three years of obtaining an operating license, a turbine system maintenance program including probability calculations of turbine missile generation based on the NRC-approved methodology such as Reference 3.5-1, or volumetrically inspect all low pressure turbine rotors at the second refueling outage and every other (alternate) refueling outage thereafter until a maintenance program is approved by the staff. (A) The staff requests that the COL applicant include the turbine system maintenance program for NRC approval as part of the COL application. Turbine integrity plays an important role in ensuring public health and safety. Therefore, the staff needs to review and approve the turbine system maintenance program to confirm that the turbine will be adequately maintained under the program before the operating license is granted. (B) The “COL holder” implies that the utility company has obtained the operating license whereas the “COL applicant” implies that the utility company has not obtained the operating licensee. Therefore, in the context of the turbine maintenance program submittal, the COL “holder” in DCD Section 3.5.1.1.1.2 should be changed to the COL “applicant”.
3.5-11	Tsao J	Explain the inspection frequency.	Provide the technical basis for volumetrically inspecting all low pressure turbine rotors at the second refueling outage and every other refueling outage, and not at every refueling outage.

3.5-12	Tsao J	Submit the probability of turbine missile generation.	DCD Section 3.5.4.4 requires that “The COL holder shall provide a turbine system maintenance program to the NRC or alternative volumetric inspection as described in Subsection 3.5.1.1.” Depending on resolution of RAI 3.5-10, the commitment in Section 3.5.4.4 may need to be revised. As written, DCD Section 3.5.4.4 is inadequate because it does not require the COL holder to submit, for staff review, the probability of turbine missile generation which is a commitment in DCD Section 3.5.1.1.1.2.
3.5-13	Tsao J	Modify Sections 3.5.1.1.1.2 and 3.5.4 to include criteria for the probability of turbine missile generation.	<p>In DCD Section 3.5.1.1.1.2, it is stated that “...the COL holder shall meet the minimum requirement for the probability of turbine missile generation given in Table 3.5-1 at COL...” This commitment is not shown in DCD Section 3.5.4, COL Information. This commitment needs to be added to DCD Section 3.5.4 as follows:</p> <p><b>3.5.4.5 Probability of Turbine Missile Generation</b></p> <p>The COL applicant shall meet the minimum requirement for the probability of turbine missile generation provided in Table 3.5-1.</p>
3.5-14	Tsao J	Explain how the turbine system is monitored to meet the probability criteria.	In DCD Table 3.5-1, it is required that if the probability of missile generation, $P_1$ , exceeds $10^{-4}$ , the COL applicant is required to take action to reduce $P_1$ to less than $10^{-4}$ before returning the turbine to service. Discuss how the COL applicant would monitor the turbine system to ensure that the probability of missile generation satisfies the acceptance criteria in DCD Table 3.5-1 during the life of the plant.

ESBWR

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