

June 22, 2006

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

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 35 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 enclosure to this letter. This RAI concerns the "Radioactive Waste Management," Chapter 11, and "Radiation Protection," Chapter 12, of Tier 2 of the ESBWR design control document. This RAI was sent to you via electronic mail on May 9, 2006 and resent on June 9, 2006. The RAIs were discussed with you during a telecon on June 7, 2006 and a followup call on June 15, 2006. You agreed to respond to these RAIs by July 7, 2006.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-2007 or [lnq@nrc.gov](mailto:lnq@nrc.gov), Amy Cubbage at (301) 415-42875 or [aec@nrc.gov](mailto:aec@nrc.gov), Lawrence Rossbach at (301) 415-2863 or [lwr@nrc.gov](mailto:lwr@nrc.gov), or Martha Barillas at (301) 415-4115 or [mcb@nrc.gov](mailto:mcb@nrc.gov).

Sincerely,

*/RA/*

Lauren Quiñones, Project Manager  
ESBWR/ABWR Projects Branch  
Division of New Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 52-0010

Enclosure: As stated

cc: See next page

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Docket No. 52-0010

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ACCESSION NO. ML061720036

OFFICE	NRBA/PM	NRBA/BC
NAME	LQuinones	ACubbage-G. Wunder for:
DATE	06/21/2006	06/22/2006

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Distribution for DCD RAI Letter No. 35 dated June 22, 2006

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Request for Additional Information - ESBWR DCD Chapter 11 and 12

RAI Number	Reviewer	Question Summary	Full Text
12.2-9	Dehmel JC	Estimates of gaseous effluent annual radionuclide activity listed in Table 12.2-16 could not be confirmed. Update Tables 12.2-15, 10.4-2 and 11.3-1.	<p>The estimates of annual airborne releases presented in DCD Tier 2, Table 12.2-16 could not be duplicated using the information presented in Tables 12.2-15, 11.1-1, 11.3-1, 10.4-2, and 9.4-1, using the BWR-GALE Code (NUREG-0016). Please address the following in Table 12.2-15:</p> <ul style="list-style-type: none"> <li>a) Provide the basis for the offgas system flow rate or refer to the appropriate DCD section that presents this information. Reconcile different flow rates for this system, 54 vs 51 m<sup>3</sup>/hr - see Table 11.3-1.</li> <li>b) Update table to include parameters corresponding to input data cards no. 20 to 28 and 32 to the BWR-GALE code.</li> <li>c) Regarding input cards no. 23 to 24, confirm that the use of charcoal and HEPA filters are consistent with HVAC system descriptions of Section 9.4 and Tables 9.4-3 to 9.4-11.</li> <li>d) Regarding input card no. 32, update entries on mass of charcoals to indicate whether the total amounts are for each operating train and state if only one or both trains will be used in parallel during routine operations.</li> <li>e) Regarding input cards no. 20 to 21 and 25, confirm whether the steam used for the gland seal system is clean steam or main turbine steam. Section 10.3.1 states that main turbine steam is used, but Section 10.4.3 states that clean steam is used. Update table to include the gland seal holdup time and iodine partition factor.</li> <li>f) Reconcile the basis for noble gas release rate, 740 MBq/sec in Table 12.2-15 vs 3700 MBq/sec in Table 11.3.-1 as the average annual or normal operational release rates. Check for consistency with Table 11.1-1</li> </ul> <p>In Table 10.4-2:</p> <ul style="list-style-type: none"> <li>g) Update table to include the air ejector holdup time and iodine partitioning factor.</li> </ul> <p>In Table 11.3-1:</p> <ul style="list-style-type: none"> <li>h) Provide the basis of the major offgas maximum permissible concentrations and its applicability to the analysis.</li> </ul> <p>Update DCD Tables 12.2-15, 10.4-2 and 11.3-1 accordingly.</p>

12.2-10	Dehmel JC	<p>Estimates of liquid effluent annual radionuclide activity listed in Table 12.2-19b could not be confirmed. Update Tables 12.2-19a, 12.2-19b, 12.2-20a and Section 12.2.4.</p>	<p>The annual radionuclide source term estimates presented in DCD Tier 2, Table 12.2-19b could not be duplicated using the information presented in Tables 12.2-19a, 12.2-20a, 11.2-3, 11.2-4, 11.1-3, and 9.3-2, using the BWR-GALE Code (NUREG-0016). Please address the following and update DCD Tables 12.2-19a, 12.2-19b, 12.2-20a and Section 12.2.4 accordingly:</p> <p>In Table 12.2-19a:</p> <ul style="list-style-type: none"> <li>a. The values for the total steam flow rate and mass of water in reactor vessel are inconsistent with that of Table 11.1-3, once unit conversions are made.</li> <li>b. Confirm the value given for the fraction of reactor coolant activity in low purity waste stream (0.11 vs 0.101).</li> <li>c. This table includes a waste stream (regenerant waste) that is not listed in Section 11.2.2 and Tables 11.2-3 and 9.3-2.</li> <li>d. The entry for detergent waste is not supported with the corresponding set of parameters and data.</li> <li>e. Update the table to include parameters corresponding to input data cards no. 20 to 28 to the BWR-GALE code.</li> </ul> <p>In Table 12.2-19b:</p> <ul style="list-style-type: none"> <li>f. Explain differences in the listing of radionuclides, deletion of 14 nuclides and additions of 6 nuclides, as compared to its prior version.</li> </ul> <p>In Table 12.2-20a:</p> <ul style="list-style-type: none"> <li>g. Reconcile inconsistency between a liquid effluent discharge rate of 20,000 L/min from the liquid waste management system (LWMS) against the value of 83,000 L/day as an estimate of the input to the LWMS - see Table 11.2-4.</li> </ul> <p>In Section 12.2.4:</p> <ul style="list-style-type: none"> <li>h. Update list of references to include all those cited in the DCD text.</li> </ul>
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11.5-22	Dehmel JC	Clarify inconsistencies between section 11.5 and 1.9.2, and update Table 1.9-21 accordingly.	<p>A review of DCD Tier 2, Section 1.9.2 (Applicability to Regulatory Criteria) revealed that it is inconsistent with Section 11.5.7.3 addressing the implementation of site-specific radiological effluent monitoring programs by the COL applicant. Currently, Table 1.9-21 does not include Regulatory Guide 4.15* in its listing of applicable guides to the ESBWR. Since Section 11.5.7.3 endorses the applicability of Regulatory Guide 4.15, it follows that it should be listed in Table 1.9-21 (NRC Regulatory Guides Applicability to ESBWR). Clarify inconsistencies between DCD Sections 11.5 and 1.9.2, and update DCD Table 1.9-21 accordingly.</p> <p>* Regulatory Guide 4.15 - Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment, Rev. 1, 2/79.</p>
11.4-1	Dehmel JC	Update Fig. 11.4-1 to show the container storage subsystem of the solid waste management system (SWMS).	DCD Tier 2, Section 11.4 states that the four subsystems of the solid waste management system (SWMS) are depicted on Fig. 11.4-1. A review of Figure 11.4-1 indicates that the container storage subsystem is not shown in this figure. Update DCD text and figure accordingly.

11.4-2	Dehmel JC	Update the power generation design bases to acknowledge the acceptance criteria of SRP Chapter 11.4.II.	The design bases section (DCD Tier 2, Section 11.4.1) does not acknowledge the acceptance criteria of SRP Chapter 11.4.II. The following criteria are not listed nor addressed: Part 20.1302; Part 20 Appendix B effluent concentrations; Part 20 Appendix G; Part 20.1406; Part 50.34a; Part 50.36a; Part 50 Appendix A GDC 60, 61, 63, and 64; Parts 61.55 and 61.56; SRP BTP (ESTB) 11-3; SRP Appendix 11.4-A; 40 CFR Part 190; Regulatory Guide 8.10; IE Bulletin No. 80-10; and Process Control Program (see Generic Letter 89-01, Suppl. 1 and NUREG-1302). Address the applicability of these criteria either as part of the design of structures, systems, and components (SSC), or as the responsibility of the COL applicant. Revise DCD Section 11.4.1 to include applicable design criteria, update descriptions of associated SSCs in Section 11.4.2; update the safety evaluation of DCD Section 11.4.3; revise testing and inspection requirements of DCD Section 11.4.4; update instrumentation requirements of Section 11.4.5; and identify information to be provided by the COL applicant in DCD Section 11.4.6. Update references in DCD Section 11.4.7 accordingly.
11.4-3	Dehmel JC	Update the provision for onsite storage of radwaste stated in Section 11.4.1 to be consistent with SRP 11.4.II and SRP Appendix 11.4-A.	The provision for onsite storage of radwaste stated in DCD Tier 2, Section 11.4.1 is inconsistent with SRP 11.4.II and SRP Appendix 11.4-A. The SRP refers the need to consider radwaste storage capabilities for several years (up to 5 years). The guidance places emphasis on the future availability or accessibility to low-level waste disposal sites, and safety considerations in the storing, handling and eventual disposition of radwaste. Accordingly, describe the design features of the SWMS facility with a provision for storing radwaste up to 5 years. Alternatively, state whether the design and construction of a long-term radwaste storage facility is the responsibility of the COL applicant. Update the provision for onsite storage of radwaste stated in DCD Section 11.4.1 to be consistent with SRP 11.4.II and SRP Appendix 11.4-A.

11.4-4	Dehmel JC	Update section 11.4.1 to describe design features addressing the requirements of Part 20.1406.	Part 20.1406 describes requirements on how design features and operational procedures will minimize, to the extent practicable, contamination of the facility and the environment, facilitate decommissioning, and minimize the generation of radioactive wastes. A review of DCD Section 12.6 indicates that design features and operational procedures described there focus on permanently installed systems. However, this discussion should describe how design features and operational procedures will be implemented with mobile and portable SWMS systems. Update DCD Tier 2 Section 11.4.1 to describe design features addressing the requirements of Part 20.1406 as they apply to the installation and use of portable/mobile SWMS and describe in Section 11.4.6 the information to be provided by the COL applicant.
11.4-5	Dehmel JC	Clarify inconsistencies between section 11.4.2.1 and 11.2.2.	DCD Tier 2, Section 11.4.2.1 notes that there will be no liquid discharges from the plant, but Section 11.2.2 assumes that such discharges will occur and provides dose estimates based on liquid effluent discharge rates. Reconcile this internal inconsistency by clarifying whether such types of liquid wastes will be routinely discharged or processed and reused, as discussed in Section 11.2.3. Update the DCD text in Sections 11.4.2.1, 11.2.2, and 12.2.3 accordingly.
11.4-6	Dehmel JC	Discuss waste volume reduction technologies by types of radwastes and how used to control effluent releases and operational exposures.	A review of DCD Tier 2, Section 11.4.2.2 describing the operations of the dry waste accumulation and conditioning subsystem indicates that compaction is not considered as a mean of reducing the volumes of compressible and compactible dry active wastes. SRP BTP ETSB 11-3 and Appendix 11.4-A recommend the use of waste volume reduction methods to reduce the amounts of waste shipped offsite for disposal and maximize the utilization of space at onsite radwaste storage facilities. Provide a discussion on the use of waste volume reduction technologies by types of radwastes and how such methods will be incorporated in the design of the Radwaste Building and facility operations in controlling effluent releases and occupational exposures. Update equipment descriptions in DCD Table 11.4-1 and revise DCD Table 11.4-2 projected radwaste volumes to the reflect the application of waste volume reduction technologies.



11.4-7	Dehmel JC	Update Section 11.4.2.2 to address waste classification requirements of Part 61.55 and waste characteristics of Part 61.56 for disposal.	DCD Tier 2, Section 11.4.2.2 does not address the waste classification requirements of Part 61.55 and waste characteristics of Part 61.56 for disposal. Provide a discussion addressing the expected distribution of Class A, B, C, and greater-than-C wastes expected to be generated under the provisions of Part 61.55. Provide a discussion of the expected waste characteristics shipped for disposal under the provisions of Part 61.56. Provide a discussion on how waste acceptance criteria of radwaste disposal facilities will be met using SWMS subsystems and update DCD Section 11.4.2.2 accordingly.
11.4-8	Dehmel JC	Update section 11.4.2.2 to address waste classification guidance of RG 1.143 for radwaste system design purposes.	DCD Tier 2, Section 11.4.2.2 does not address the waste classification guidance of Regulatory Guide 1.143 in designing radwaste systems. Provide a discussion addressing how the three safety classes or classifications for radwaste management facilities were addressed in the proposed design of the SWMS and update DCD Section 11.4.2.2 accordingly.
11.4-9	Dehmel JC	Provide estimate of spent charcoal generation and describe provisions to manage and ship spent charcoal for disposal.	A review of the types of dry wastes described in DCD Tier 2, Section 11.4.2.2 indicates that spent charcoal is not included in the description. The proposed design of the Charcoal Vault (See DCD Sections 11.2 and 11.3) indicates that over 30,000 kg of charcoal will be contained in tanks. Given that the spent charcoal will be periodically replaced, provide an estimate the amounts of spent charcoal that will be generated yearly as radwaste from the turnover of the guard beds (2 tanks) and main parallel trains (8 tanks), and describe the provisions that will be used to manage and ship spent charcoal for disposal. Update equipment descriptions in DCD Table 11.4-1 and revise DCD Table 11.4-2 to include an annual estimate of the projected amounts of spent charcoal shipped as radwaste.

11.4-10	Dehmel JC	Provide basis for stated waste volume reduction factor of two for the "LWMS Concentrated Waste" stream.	A review of DCD Tier 2, Table 11.4-2 indicates that the basis of a waste volume reduction factor is missing. Provide the basis for the stated waste volume reduction factor of two for the "LWMS Concentrated Waste" stream. Describe the type of waste volume reduction technology that would be used to achieve such a volume reduction. Update DCD Table 11.4-2 accordingly.
11.4-11	Dehmel JC	Describe provisions to avoid contamination of non-radioactive systems or uncontrolled or unmonitored releases	A review of DCD Tier 2, Section 11.4.3 indicates that the text does not identify provisions, systems, or procedures addressing the detection of radioactivity in non-radioactive systems (as interface) to prevent unmonitored and uncontrolled releases of radioactive materials in the environment. See regulatory positions from Regulatory Guide 1.143 and IE Bulletin No. 80-10 for details. Describe system design features and operational procedures to ensure that inter connections between plant systems and mobile processing equipment will avoid the contamination of non-radioactive systems or uncontrolled and/or unmonitored releases of radioactivity in the environment. Update DCD Section 11.4-3 accordingly.

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