February 27, 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. 11 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 requests for additional information (RAIs) are contained in the enclosure to this letter. These RAIs concern the control rod drive (CRD) system (DCD, Tier 2, Chapter 4.6) and the application of the TRACG thermal-hydraulic code for ESBWR analyses. The CRD RAIs were sent to you via electronic mail on January 26, 2006, and were discussed with you during a telecon on February 7, 2006. You agreed to respond to these RAIs by March 15, 2006. The TRACG RAIs were e-mailed to you on February 10, 2006, and you agreed to respond to these RAIs on March 1, 2006.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA L. Rossbach for:/

Amy E. Cubbage, Senior Project Manager
New Reactor Licensing 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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ADAMS ACCESSION NO. ML060550179

OFFICE	PM:NRBA	BC:NRBA
NAME	ACubbage-LRossbach for:	LDudes-JFWilliams for:
DATE	02/24/2006	02/27/2006

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Distribution for DCD RAI Letter No. 11 dated February 27, 2006

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Draft Request for Additional Information (RAI)
Design Control Document (DCD) Section 4.6 "Functional Design of Reactivity Control System"

RAI number	Reviewer	Question Summary	Full Text
4.6-1	Thomas G	Safety classification of CRD system	The control Rod Drive (CRD) system provides the high pressure make up water to the reactor when the feedwater system is not available. In DCD Section 15.2.5.3, Loss of all Feedwater Flow", credit is taken for the CRD system in the transient analyses. Credit can be taken only for safety grade equipment in the transients and accidents analyses. Explain in detail why the CRD system is not designated as a safety grade system.
4.6-2	Thomas G	CRD makeup capacity	Specify the maximum pipe break size for which the CRD system can make up for the inventory lost through the break in the reactor coolant boundary.
4.6-3	Thomas G	Fine motion control rod drive (FMCRD) design differences between ABWR and ESBWR	The staff has previously approved an FMCRD system for the ABWR. We understand that the ESBWR FMCRD system may be similar to the system approved for ABWR. Please identify the differences, if any, between the two designs.
4.6-4	Thomas G	Minimum drive position increment	According to the ABWR DCD, the electric motor-driven ball-nut and spindle assembly is capable of positioning the drive at a minimum of 18.3 mm increments. But for the ESBWR design, the minimum increment is 36.5 mm (1.44 in.). Why is the minimum increment increased for ESBWR?
4.6-5	Thomas G	Address GDC 4 for control rod drive system	Standard Review Plan (SRP) Section 4.6, Draft Revision 3, April 1996, lists General Design Criteria (GDC) 4 as one of the acceptance criteria for the functional design of control rod drive system. GDC 4 is applicable to ESBWR reactivity control systems. GDC 4 is not addressed in DCD Section 4.6. Include reference to GDC 4 in the DCD Section 4.6.
4.6-6	Thomas G	Reference to DCD section 4.6 in DCD section 3.1.3.4	GDC 23 is included in DCD Section 4.6, however, there is no reference of DCD Section 4.6 in DCD Section 3.1.3.4, "Criterion 23." Add a reference to DCD Section 4.6 in DCD Section 3.1.3.4.
4.6-7	Thomas G	Failure Modes and Effects Analyses (FMEA) analysis for control rod drive system	SRP Section 4.6, Revision 1, July 1981, specifies that the staff reviews an FMEA to assure that a single failure occurring in the control rod drive system, or an operator error, will not result in the loss of capability for safe shutdown. We understand that an FMEA was submitted for ABWR. Submit an FMEA for the ESBWR.

RAI number	Reviewer	Question Summary	Full Text
4.6-8	Thomas G	Sufficient differential pressure to insert FMCRD during ATWS	For the ESBWR FMCRD system, the scram discharge volume is diverted to the reactor vessel rather than to the scram discharge volume pipe as in current BWRs. There is a concern that if the reactor is at high pressure during an ATWS, there may not be sufficient differential pressure to insert the FMCRD into the reactor. Explain in detail why this is not a concern in ESBWR. Confirm that there is sufficient differential pressure to insert the FMCRD into the reactor for ESBWR.
4.6-9	Thomas G	Loss of scram function due to slow loss of control air pressure	Confirm that the design incorporates features to prevent the loss or impairment of the scram function due to a slow loss of control air pressure in the air system.
4.6-10	Thomas G	Identification of safety related portions of CRD and separation between safety and non-safety portions	Identify the essential portions of the CRD system which are safety related. Describe how the safety related portions of the system are isolated from the non-essential portion of the system.
4.6-11	Thomas G	Power supply for CRD pumps	The control rod drive pumps are used for high pressure make-up to the reactor. Confirm that the pumps power supply is from the diesel generator bus.
4.6-12	Thomas G	Failure of scram accumulator affect on adjacent rods	Describe the relative core location of control rods sharing a scram accumulator. Can a failure of the scram accumulator fail to insert adjacent rods? If so, discuss the consequences of that failure.
4.6-13	Thomas G	Hydraulic Control Unit (HCU) design details	Submit detailed drawings of the HCU and describe in detail the design of the HCUs.
4.6-14	Thomas G	Velocity limiter	We understand that the control rod has no velocity limiter. Discuss in detail the reason for elimination of the velocity limiter in the ESBWR design.
4.6-15	Thomas G	Separation between standby liquid control system (SLCS) and FMCRD	Confirm that the SLCS and the safety related portions of the FMCRD system are located in different parts of the reactor building and are not vulnerable to common mode failure.

RAI number	Reviewer	Question Summary	Full Text
4.6-16	Thomas G	Power supply to the cooling water to the CRD pump oil cooler and operation of auxiliary oil pump	Confirm that the power supply to the reactor component cooling water system which supplies cooling water to the lube oil cooler is from the diesel generator. Confirm whether the auxiliary oil pump shown on page 2 of the P & I.D. 105E3926,Rev.0 is run continuously or only intermittently to make up the oil supply.
4.6-17	Thomas G	CRD supply pump discharge check valve	In DCD Section 4.6.1.2.4, CRD supply pump (Page 4.6-12) it is stated that: "— A discharge check valve prevents backflow through the non-operating pump." But the P & I.D 105E3926, Sheet No. 2 does not show any check valve at the pump discharge. Clarify this discrepancy.
4.6-18	Thomas G	Function and operation of fill pump	What is the purpose of the Fill Pump shown on sheet 2 of the P& I.D. 105E3926,Rev.0? Confirm whether this pump will be running continuously.
4.6-19	Thomas G	Scram time for electric scram	DCD Table 4.6-2 indicates the scram time for the hydraulic scram. Specify the scram time for the electric scram.
4.6-20	Thomas G	Ball check valve function	In the operating BWRs, the ball check valves ensure rod insertion in the event the accumulator is not charged or the inlet scram valve fails to open if the reactor pressure is above 600 psig. This feature was not provided in the ABWR and SBWR designs. Confirm whether this feature exists for ESBWR. If so, confirm that the ball check valve ensures rod insertion in the event the accumulator is not charged or the inlet scram valve fails to open if the reactor pressure is above 600 psig, and include a discussion of the function of the ball check valve in the DCD.
4.6-21	Thomas G	ITAAC for CRD motor speed	In DCD Tier 1 Table 2.2.2-1, ITAAC for CRD system, Item No. 3, motor speed is not specified. Include the motor speed as in the ABWR ITAAC.

Draft Requests for Additional Information (RAIs)
ESBWR Design Certification Review - TRACG code evaluation (SER section 21.6)

RAI number	Reviewer	Question Summary	Full Text
4.6-22	G. Thomas	Function of purge water flow	On page 4.6-12 of the DCD, it is stated that "the purge flow maintains the RPV water level reference leg instrument lines filled to address the effects of noncondensible gases in the instrument lines to prevent erroneous reference information after a rapid RPV depressurization event." According to P & I.D. 105E3926, Rev.0, the purge line branches into two, one going to the RPV level instrument reference legs, and the other branch goes to the individual drives. In the CRD system for operating BWRs, the major function of the cooling water was to cool the drive mechanism and its seals to preclude damage resulting from long term exposure to reactor temperature. It is our understanding that the seals are eliminated for ESBWR. What is the function of purge water flow to the drives?

RAI Number	Reviewer	Question Summary	Full Text
21.6-1	Landry R Klein V	Does the total core pressure drop listed in DCD Table 4.4-1a include the core support plate pressure drop?	The DCD provides the core pressure drop and the core support plate pressure drop in Table 4.4-1a. The staff has used these pressure drops to back out the loss coefficients to be used in the 4500 MWth ESBWR TRACE input model for independent calculations. Does the total core pressure drop listed in DCD Table 4.4-1a include the core support plate pressure drop? If not, provide this information.
21.6-2	Landry R Klein V	Provide an updated version of MFN 04-063 “Hypothetical ESBWR Core Design.”	Provide an updated version of MFN 04-063 “Hypothetical ESBWR Core Design” so that the staff can update its PARCS model to perform independent calculations for design certification. In addition to the information provided in this document, also include a 3D void history and control rod history.
21.6-3	Landry R Klein V	Provide TRACG input decks for the staff to use in the independent calculations of ATWS events.	Please provide the following TRACG input decks for ATWS analyses: loss of condenser vacuum (LCV) and loss of feed water heating (LOFWH). Include all necessary baseline, extract and restart decks along with all PANACEA wrapup files and 3D kinetics input files (TDT/TOSDAT) files.

cc:

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