August 8, 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. 49 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. The RAI questions 4.4-10 through 4.4-14 are related to the TRACG application for stability evaluation of the ESBWR as discussed in Chapter 4.D of the ESBWR design control document. This set of RAI was sent to you via electronic mail on July 11, 2006. You did not request a telecon and agreed to respond to this set of RAI on August 31, 2006.

The RAI question 21.6-54, related to NEDC-33239P, "GE14 for ESBWR Nuclear Design Report," was sent to you via electronic email on July 11, 2006, and was discussed with your staff during a telecon on July 31, 2006. You agreed to respond to this RAI on August 18, 2006. The RAI question 21.6-76, related to the ESBWR separators was discussed with your staff during a telecon on July 31, 2006. You agreed to respond to this RAI on September 15, 2006.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-4115 or mcb@nrc.gov or you may contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Martha Barillas, Project Manager
ESBWR/ABWR Projects 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. ML062190254

OFFICE	NESB/PM	NESB/BC(A)
NAME	MBarillas	JColaccino
DATE	08/08/2006	08/08/2006

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Distribution for DCD RAI Letter No. 49 dated August 8, 2006

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Request for Additional Information (RAI)
ESBWR Design Control Document (DCD), Tier 2, Chapter 4D "Stability Evaluation"

RAI number	Reviewer	Summary	Full Text
4.4-10	Landry R Klein V	Update stability criteria in Chapter 4 of the DCD.	DCD Tier 2, Section 4D.1.1, "Stability Criteria," describes the criteria used to establish stable operation by using a map of core and channel decay ratios. DCD Tier 2, Section 4.3.3.6.2 states that "The ESBWR licensing basis for stability is satisfied by determining a stability criteria map of core decay ratio vs. channel decay ratio to establish margins to stability." During the review of NEDE-33083P, Supplement 1, "TRACG Application for ESBWR Stability Analysis," GE agreed (MFN 06-009) to modify the stability design criteria to include regional decay ratio calculations. Update the DCD accordingly to reflect this.
4.4-11	Landry R Klein V	Calculate density-wave stability with fine-nodalization in chimney.	Provide a core, channel, and regional stability calculation with fine nodalization in the chimney. Adjust the size of the chimney nodes to obtain a Courant number close to 1.0. The purpose of this calculation is to evaluate the effect of the chimney on the density-wave stability performance.
4.4-12	Landry R Klein V	Confirm buoyancy-driven oscillations do not develop.	Using the TRACG model developed in RAI 4.4-11, perturb the buoyancy term in the chimney to confirm that buoyancy-driven oscillations do not develop.
4.4-13	Landry R Klein V	Update DCD Chapter 4 to confirm unstable oscillation does not develop during startup.	Update the DCD Tier 2 documentation to include a TRACG calculation of the ESBWR startup transient including nuclear feedback to confirm that unstable oscillation do not develop during startup.
4.4-14	Landry R Klein V	Provide the value for each parameter in Table 4.4-14.	Provide the value for each parameter provided in Table 4.4-14 for the core design provided in the ESBWR DCD.

Table - RAI 4.4-14

Parameter	Units	Value
Inlet K	"ODYSY"	
Inlet K (periphery)	"ODYSY"	
# fuel rods		
channel height	cm	
Heat transfer area per unit axial length	cm	
Channel flow area	cm^2	
Hydraulic diameter	cm	
Density of the fuel	g/cm^3	
Fuel pellet diameter	cm	
Cladding heat capacity	cal/cm^3 °C	
Cladding thermal conductivity	cal/cm s °C	
Cladding thickness	cm	
Gap heat transfer coefficient	cal/cm^2 s °C	
Gap width	cm	
System Pressure	psi	
Core Inlet Coolant Temperature	C	
Total Core Thermal Power	MWth	
Total Flow rate (active + bypass)	Mlb/h	
Fraction of total flow rate through bypass at rated power	%	

Request for Additional Information (RAI)
"NEDC-33239P, GE14 for ESBWR Nuclear Design Report"

RAI Number	Reviewer	Question Summary	Full Text
21.6-54	Landry R Klein V Attard A	Provide additional design information for the ESBWR design fuel.	Provide the following design information related to NEDC-33239P, "GE14 for ESBWR Nuclear Design Report," February 2006, for the staff's independent calculations: A. PANACEA 3D exposure data, fuel composition, and void history data at BOC, EOC and MOC. B. Hot Full Power (HFP) temperature of the fuel (UO_2), clad, and coolant. C. The size of the perturbation for temperature and void used to calculate Doppler, moderator and void coefficients. D. Fuel density for UO_2 and UO_2+Gad. E. Bundle structural materials and associated densities. F. Dimensions, compositions, densities and typical operating temperatures for the control rods. G. Dimensions for the letters in diagram in Figure 1-1 for bundles 90018 and 90019. H. Additional information defining exactly what is meant by the terms "shutdown margin" and "control rod worth". I. Additional fission rate distribution and power distribution for lattices 81802 and 81902 for higher exposures (5, 15, 30, 45, and 60 Gwd/ST) J. Are the local peaking values presented in Figure 3-7 through Figure 3-13 based on fission rate or deposited energy (i.e. with gamma energy redistribution)?

RAI Number	Reviewer	Question Summary	Full Text
21.6-76	Klein V (Barber D, ISL)	Provide design information about the ESBWR separators.	Provide additional design information on the ESBWR separators for the staff's independent TRACE calculations. Include details on the dimensions, losses, carry under and carry over fractions.

cc:

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