December 6, 2007

Mr. Robert E. Brown
Senior Vice President, Regulatory Affairs
GE-Hitachi Nuclear Energy Americas, LLC
3901 Castle Hayne Road, MC A-45
Wilmington, NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 122 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Brown:

By letter dated August 24, 2005, GE-Hitachi Nuclear Energy Americas, LLC (GEH) 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.

To support the review schedule, you are requested to provide the requested additional information within 45 days of the date of this letter.

If you have any questions or comments concerning this matter, you may contact me at 301-415-3025 or cpp@nrc.gov or you may contact Amy Cubbage at 301-415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Chandu Patel, Senior Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosure:
Request for Additional Information

cc: See next page

December 6, 2007

Mr. Robert E. Brown
Senior Vice President, Regulatory Affairs
GE-Hitachi Nuclear Energy Americas LLC
3901 Castle Hayne Road, MC A-45
Wilmington, NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 122 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Brown:

By letter dated August 24, 2005, GE-Hitachi Nuclear Energy Americas, LLC (GEH) 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.

To support the review schedule, you are requested to provide the requested additional information within 45 days of the date of this letter.

If you have any questions or comments concerning this matter, you may contact me at 301-415-3025 or cpp@nrc.gov or you may contact Amy Cubbage at 301-415-2875 or aec@nrc.gov.

Sincerely,
/RA/
Chandu Patel, Senior Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010
Enclosure:
Request for Additional Information
cc w/encl: See next page

Distribution:

Public	RidsNroDeSeb2	NRay
RidsNroDnrlNge1	ALee	DShum
NGE1 R/F	RidsNroDeEmb2	PYChen
RidsNroDnrlNge2	CLi	GGeorgiev
LPerkins	RidsNroDsraSbpb	JCDehmel
RidsAcrsAcnwMailCenter	YDiaz-Castillo	CHinson
ACubbage	RidsNroDeCib2	RidsNroDcipChpb
RidsOgcMailCenter	EForrest	DJeng
SChakrabarti	RidsNroDsraSbcv	

ADAMS ACCESSION NO. ML073381170

OFFICE	NGE2/PM	NGE1/LPM	NGE1/BC
NAME	CPatel	ACubbage	MShuaibi
DATE	12/5/2007	12/4/2007	12/06/2007

OFFICIAL RECORD COPY

COL Information Items, Revision 4
Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD), Revision 4

RAI Number	Reviewer	Question Summary	Full Text
3.8-116	Chakrabarti S	Include in Tier 1 the COL information items pertaining to Section 3.8.	Part 5 of the supplemental response (MFN 07-626, dated November 21, 2007) to RAI 3.7-61 states that the four items deleted from DCD Tier 2, Revision 1, Subsection 3.8.6 will be added back to DCD Tier 2, Subsection 3.8.6 with pointers to DCD Tier 1, Table 2.15.1-2; DCD Tier 2, Table 2.0-1; and DCD Tier 2 Section 3.8. The proposed text for these four items were provided and it has been revised from the DCD Tier 2, Revision 1 version. Based on the proposed new text, the staff requests GEH to revise the DCD to address the following items: 1) The second bullet, “Site-specific physical properties and foundation settlement,” should include in its list of requirements the minimum soil friction value of 30 degrees. This parameter is currently in DCD Tier 2, Table 2.0-1, and DCD Tier 1, Table 5.1-1, and is also relied upon in the response to RAI 3.8-96 to address the sliding capability of seismic Category I structures. 2) The second bullet identifies that the soil property requirement for "maximum settlement values for seismic Category I buildings" are presented in DCD Tier 2, Table 2.0-1. While this requirement is included in DCD Tier 2, Table 2.0-1, it should also be included in the corresponding DCD Tier 1, Table 5.1-1.

3.9-177	Lee A	Design specification and design reports required by the Code for vessels, pumps, valves and piping systems should be made available for audit or address the issue through ITAAC	In DCD,Tier 2, Revision 3, there is a COL Information Item 3.9.9.4, which states that COL holders shall make available to the NRC staff design specification and design reports required by the Code for vessels, pumps, valves and piping systems for the purpose of audit. In Revision 4, this item is no longer listed under Subsection 3.9.9, COL Information. GEH is requested to reinstate this COL item in the DCD as an applicant item or to address the item through ITAAC. To allow addressing the item through an ITAAC, thereby moving completion of the design to after licensing, design acceptance criteria will need to be requested similar to piping. If the COL item is reinstated and Piping DAC requested, piping should be separated out from COL Information Item 3.9.9.4 so that it is fully addressed through the DAC.
5.2-2-S03	Li C	Missing the focus of a COL holder item.	In RAI 5.2-2 S02 Part B, the staff requested that the applicant revise the COL holder item to indicate that the procedures to be developed are for low level unidentified reactor coolant system (RCS) leakage (i.e., lower than the TS limit). DCD Tier 2 Revision 4, Section 5.2.5.9 (COL 5-2-2-H) identifies the procedures to be developed by the COL Holder in the second paragraph. However, the focus of this COL Holder item should specify more clearly that it deals with the low level RCS leakage (i.e., well below the TS limit). The staff requests that the applicant provide a clear and unambiguous description of the procedures as pertaining to low level RCS leakage.
6.1-16, Supplement No. 1 (MFN 07-436, August 4, 2007)	Diaz-Castillo Y	Revise the COL Information Item for the applicant to provide a bounding value for the amount of unqualified coatings including the assumptions used to determine this bounding value. Provide an ITAAC.	In response to RAI 6.1-16, GEH stated that "the total amounts of organic materials that do not meet requirements cannot be determined at the beginning of the COL Applicant stage." The DCD, Tier 2, Revision 4, Section 6.1.3, COL Information Item 6.1.3-1-A, states: The COL Applicant will: 1. Describe the approach to be taken to identify and quantify all organic materials that exist within the containment building in significant amounts that do not meet the requirements of ASTM D-5144 and Regulatory Guide 1.54 as per Section 6.1.2.

			2. Provide the milestone when evaluations will be complete to determine the generation rate, as a function of time, of combustible gases that can be formed from these unqualified organic materials under DBA conditions. 3. As part of these evaluations, provide the technical basis and assumptions used. The intended purpose of the original question was for the COL Applicant to provide the total amount of organic materials that do not meet the requirements of Regulatory Guide 1.54. A. Given that this information is not going to be available before the procurement of the components, the staff requests that you revise the DCD to provide a bounding value for the amount of unqualified coatings. Provide the technical basis and assumptions for this bounding value including evaluation of the generation rate, as a function of time, of combustible gases that can be formed from these unqualified organic materials under DBA conditions. B. In addition, please provide ITAAC in DCD Tier 1 to verify the total amount of protective coatings and organic materials used inside containment that do not meet the requirements of ASTM D 5144 and Regulatory Guide 1.54.
6.4-19	Forrest E	Revise COL Information Item 6.4-2-A to include the full scope of activities for which the applicant would be responsible in event of a Toxic Event. .	In DCD, Tier 2, Revision 4, COL Information item, 6.4-2-A, Toxic Gas Analysis, states: "The COL Applicant will identify potential site specific toxic or hazardous materials that may affect control room habitability in order to meet the requirements of TMI Action Plan III. D.3.4 and GDC 19. " The staff understands that the ESBWR has no provision for detecting and responding to a toxic gas event. Thus, the COL Applicant would not only have to identify potential site specific toxic or hazardous materials, but it would also have to include site specific design features

			such as monitoring equipment and other changes as necessary to respond to a toxic gas event including isolation capability and respirators if needed. These site specific features would need to be considered for inclusion in site-specific ITAAC and technical specifications. Please revise the COL Information Item to include the full scope of activities for which the applicant would be responsible.
10.2-26	Georgiev G	Submittal of Turbine Maintenance Program to the NRC for Review	In Revision 4 to the ESBWR DCD, the ITAAC requiring the COL applicant to provide an analysis of the probability of missile generation was deleted. The probability of external turbine missile generation is dependent also upon effective implementation of the turbine system vendors' maintenance program. The staff requests that the applicant revise the DCD to include the following actions for the COL Holder: (1) The COL Holder shall submit for NRC review and approval, a turbine system maintenance program including probability calculations of turbine missile generation based on the NRC approved methodology prior to the delivery of the turbine to the site; (2) The COL Holder shall conduct volumetric inspections of all low pressure turbine rotors at the second refueling outage and every other (alternate) refueling outage if the turbine maintenance program has not been approved by the staff.
11.5-47 S01	Dehmel JC	A review of COL action items in DCD Tier 2, Revision 4, Section 11.5.7 indicates a number of inconsistencies in tying COL action items to missing references, applicability to DCD Tier 2, Section 13.4 for the implementation of	A review of COL action items presented in DCD Tier 2, Revision 4, Section 11.5.7 indicates a number of inconsistencies in tying the COL action items to missing references, applicability to DCD Tier 2, Section 13.4 for the implementation of operational programs, and specificity in qualifying some aspects of "instrument sensitivities." More specifically, review and update the DCD in light of the following observations: (a) COL action item 11.5-2-A refers to NUREG-1302 and NUREG-0133; however, both documents are not included in the references, DCD Section 11.5.8. The full citations of both NUREGs should be included in DCD Section 11.5.8.

		operational programs, and specificity in qualifying some aspects of "instrument sensitivities."	(b) COL action item 11.5-2-A refers to the COL responsibility for the preparation of a plant and site specific ODCM. Given that the ODCM is one of several operational programs document, the COL action item should note that the implementation is addressed in DCD Section 13.4 and that the COL applicant will provide a milestone for the implementation of the ODCM. Note: For consistency, see acceptable provisions used for a related operational program (PCP) in COL action item 11.4-3-A, DCD Section 11.4. (c) COL action item 11.5-5-A addresses instrument sensitivities and frequencies for liquid and gaseous samples. However, the COL item does not provide any attribute to, nor explains what is meant by "frequencies." Accordingly, the COL action item should qualify that "frequencies," refers to sampling and analytical frequencies, given the provisions listed in DCD Section 11.5, Tables 11.5-5 to 11.5-8, with the remaining elements of the COL action item remaining unchanged. Accordingly, address the above observations and update the DCD Tier 2, Section 11.5.7.
12.2-24	Hinson C	COL item 12.1-3-A should be modified to reference RG 1.206 which includes reference to numerous other RGs .	In DCD Tier 2, Revision 4, Section 12.1.4, the reference to RG 1.70 was removed from the description of COL item 12.1-3-A, Operational Considerations. Reference to RG 1.70 should be replaced by reference to RG 1.206. RG 1.206 contains references to a number of RGs which provide guidance on operational considerations for a radiation protection program. Modify COL item 12.1-3-A to state that the COL applicant will demonstrate compliance with the guidance contained in RG 1.206 which includes reference to the following RGs: 8.2, 8.7, 8.9, 8.13, 8.15, 8.20, 8.25, 8.26, 8.27, 8.28, 8.29, 8.34, 8.35, 8.36, and 8.38. Update Table 1.9-21 to include reference to these RGs as applicable to design certification.
12.6-3	Hinson C	Modify COL item 12.5-1-A to add reference to RG 1.206.	In Revision 4 of DCD Tier 2, Section 12.5.4 (for COL item 12.5-1-A (formerly 12.5.4.2)), the applicant deleted reference to RG 1.70 as providing guidance for the description of plant health physics

			equipment, instrumentation, and facilities. The applicant should modify this COL item to add reference to RG 1.206 for providing the needed guidance to the COL applicant.
12.6-4	Hinson C	Correction to COL item 12.5-2-A title to quote regulation correctly.	Modify the title of COL item 12.5-2-A as follows to quote the correct part of the regulation: "Compliance with Paragraph 50.34 (f) (2) (xxvii) of 10 CFR 50 and NUREG-0737 Item III.D.3.3."
12.6-5	Hinson C	Modify COL item 12.5-3-A to add reference to RG 1.206.	In Revision 4 of DCD Tier 2, Section 12.5.4 (for COL item 12.5-3-A (formerly 12.5.4.1)), the applicant deleted reference to RG 1.70 as providing guidance for the description of the operational radiation protection program. The applicant should modify this COL item to add reference to RG 1.206 for providing the needed guidance to the COL applicant.
3.7-61 S01	Jeng D	Include COL information removed from DCD Section 3.7.5 in Tier 1.	RAI 3.7-61 (part 5) The staff reviewed GEH's response provided under MFN 07-626 dated 11-21-07. For part 5 of the response, concerning the COL items, the staff notes that GEH has provided references in Section 3.7.5, "Site-Specific Information," to address staff request. However, in the DCD mark-up included in its response, GEH provided references only to Tier 2, Table 2.0-1, for site-specific requirements for soil properties and seismology. Currently, Tier 1 Table 5.1-1 (DCD Revision 4) contains only portion of the relevant information included in Tier 2, Table 2.0-1, without the notes that provide interpretation of the key site parameters. The staff requests that GEH include references for site-specific information to information contained in Tier 1, along with the applicable notes, or provide justification for doing otherwise.
3.10-5 S03	Chen P	Dynamic Qualification Report milestone information should be submitted to allow staff audit	Revise the COL information for Dynamic Qualification Report to state that the COL applicant should submit an implementation program for seismic and dynamic qualification of ESBWR mechanical and electrical equipment, including milestones and completion dates with appropriate information to allow staff audit.
3.5-18	Shum D	COL holder needs to establish procedures to prevent equipment from becoming a missile	GE analyzed the gravitational missiles inside containment and determined that Seismic Category I SSCs are designed with no potential to become a gravitational missile source. With regards to equipment, such as a hoist that is required during maintenance, GEH stated that such equipment will be either removed during operation to a location where it is not a potential hazard to safety-related equipment

			or seismically restrained to prevent it from becoming a missile. The COL holder needs to establish procedures to require equipment, such as a hoist that is required during maintenance, either be removed or seismically restrained following maintenance to prevent it from becoming a missile.
9.2- 16	Li C	Missing a COL action item for the station water system	In DCD tier 2, Revision 4, Section 9.2.10.2, it states that "the above conceptual design information for the station water system will be replaced with site-specific design information in the COLA FSAR." This statement identifies a COL action item. However, it is not accounted for in the summary of COL Information (Section 9.2.10.6).
9.2- 17	Li C	Missing a COL action item for the MWS	In DCD tier 2, Revision 4, Section 9.2.3.2, it states that "the above conceptual design information for the MWS will be replaced with site-specific design information in the COLA FSAR." This statement identifies a COL action item. However, it is not accounted for in the summary of, COL Information (Section 9.2.3.6).
9.2- 18	Li C	Missing a COL action item for the potable and sanitary water systems	In DCD tier 2, Revision 4, Section 9.2.4, it states that "the above conceptual design information for the potable and sanitary water systems will be replaced with site-specific design information in the COLA FSAR." This statement identifies a COL action item. However, it is not accounted for in the summary of, COL Information. In light of RAIs 9.2-16, 9.2-17, and 9.2-18, please review the entire DCD for other areas where COL action items are not appropriately accounted for in the summary of COL information, and provide the results of this review to the staff.
5.3-7S02	Ray N	Updated Pressure and Temperature Limits Report (PTLR)	In Revision 4 of the DCD Tier 2, Section 5.3.1.5, the applicant stated, "An updated Pressure and Temperature Limits Report (PTLR) is developed in accordance with the Technical Specifications." The applicant has not yet submitted the PTLR for NRC review and approval, thus, the statement referring to an *update* is not appropriate at this time. The applicant needs to clearly identify who (COL Applicant or GEH) will prepare the PTLR and when it will be submitted for NRC review and approval. The staff requests that GEH revise the DCD Sections 5.3.1.5 and 5.3.4 accordingly to reflect this change including adding a COL Information Item if the PTLR will not be submitted by GEH *as part of the design certification*.

3.7-62	Jeng D	Include COL information regarding iterated soil properties	As part of the resolution of RAI 3.7-38, the staff requests that the applicant identify a COL information item specifying that the COL applicant verifies that the iterated soil properties at the site fall in the range of those considered in the generic Soil Structure Interaction analysis.
3.4-12	Shum D	Include COL information regarding procedures for flood protection	The ESBWR flood protection relies on plant personnel to take appropriate measures to assure that all facility flood protection measures are in place as a flood condition develops. The COL holder should have emergency operating procedures directing plant personnel to take the appropriate actions as flood condition develops.
18.11-36	Bongarra J	Develop a detailed HFE V&V Implementation Plan	Please add a COL action item as follows, or alternatively, GEH is requested to provide the requested information as part of the design certification scope: The COL applicant shall develop a detailed HFE V&V implementation plan that provides the methodology and procedures for operation condition sampling, design verification, integrated system validation, and human engineering discrepancy resolution. The plan shall be submitted to the NRC staff for review using the review criteria contained in NUREG-0711, Section 11.

DC GE - ESBWR Mailing List

cc:

Ms. Michele Boyd
Legislative Director
Energy Program
Public Citizens Critical Mass Energy
and Environmental Program
215 Pennsylvania Avenue, SE
Washington, DC 20003

W. Craig Conklin, Director
Chemical and Nuclear Preparedness &
Protection Division (CNPPD)
Office of Infrastructure Protection
Department of Homeland Security
Washington, DC 20528

Mr. Marvin Fertel
Senior Vice President
and Chief Nuclear Officer
Nuclear Energy Institute
1776 I Street, NW
Suite 400
Washington, DC 20006-3708

Mr. Ray Ganthner
AREVA, Framatome ANP, Inc.
3315 Old Forest Road
P.O. Box 10935
Lynchburg, VA 24506-0935

Vanessa E. Quinn, Acting Director
Technological Hazards Division
National Preparedness Directorate
Federal Emergency Management Agency
500 C Street, NW
Washington, DC 20472

Email

APH@NEI.org (Adrian Heymer)
awc@nei.org (Anne W. Cottingham)
bennettS2@bv.com (Steve A. Bennett)
bevans@enercon.com (Bob Evans)
bob.brown@ge.com (Robert E. Brown)
BrinkmCB@westinghouse.com (Charles Brinkman)
chris.maslak@ge.com (Chris Maslak)
CumminWE@Westinghouse.com (Edward W. Cummins)
cwaltman@roe.com (C. Waltman)
dan1.williamson@ge.com (Dan Williamson)
david.hinds@ge.com (David Hinds)
david.lewis@pillsburylaw.com (David Lewis)
David.piepmeyer@ge.com (David Piepmeyer)
dlochbaum@UCSUSA.org (David Lochbaum)
don.lewis@ge.com (Don Lewis)
erg-xl@cox.net (Eddie R. Grant)
frankq@hursttech.com (Frank Quinn)
Frostie.white@ge.com (Frostie White)
gcesare@enercon.com (Guy Cesare)
george.honma@ge.com (George Honma)
george.stramback@gene.ge.com (George Stramback)
george.wadkins@ge.com (George Wadkins)
GovePA@BV.com (Patrick Gove)
greshaja@westinghouse.com (James Gresham)
gzinke@entergy.com (George Alan Zinke)
hickste@earthlink.net (Thomas Hicks)
james.beard@gene.ge.com (James Beard)
jcurtiss@winston.com (Jim Curtiss)
jgutierrez@morganlewis.com (Jay M. Gutierrez)
jim.kinsey@ge.com (James Kinsey)
jim.riccio@wdc.greenpeace.org (James Riccio)
JJNesrsta@cpsenergy.com (James J. Nesrsta)
joel.Friday@ge.com (Joel Friday)
john.o'neil@pillsburylaw.com (John O'Neil)
john.sorensen@ge.com (John Sorensen)
Joseph.savage@ge.com (Joseph Savage)
Joseph_Hegner@dom.com (Joseph Hegner)
junichi_uchiyama@mnes-us.com (Junichi Uchiyama)
kathy.sedney@ge.com (Kathy Sedney)
kenneth.ainger@exeloncorp.com (Kenneth Ainger)
KSutton@morganlewis.com (Kathryn M. Sutton)
kurt.schaefer@ge.com (Kurt Schaefer)
kwaugh@impact-net.org (Kenneth O. Waugh)
lou.lanese@ge.com (Lou Lanese)
lynchs@gao.gov (Sarah Lynch - Meeting Notices Only)
MaddenG@BV.com (George Madden)
Margaret.Bennet@dom.com (Margaret Bennet)

maria.webb@pillsburylaw.com (Maria Webb)
mark.beaumont@wsms.com (Mark Beaumont)
Marvin.Smith@dom.com (Marvin L. Smith)
matias.travieso-diaz@pillsburylaw.com (Matias Travieso-Diaz)
media@nei.org (Scott Peterson)
mgiles@entergy.com (M. Giles)
mike_moran@fpl.com (Mike Moran)
mwetterhahn@winston.com (M. Wetterhahn)
nirsnet@nirs.org (Michael Mariotte)
PAC2@nrc.gov (Peter Cochran)
pareez.golub@ge.com (Pareez Golub)
Pat.Woodfin@ge.com (Pat Woodfin)
patriciaL.campbell@ge.com (Patricia L. Campbell)
paul.gaukler@pillsburylaw.com (Paul Gaukler)
Paul@beyondnuclear.org (Paul Gunter)
peter.jordan@ge.com (Peter Jordan)
phinnen@entergy.com (Paul Hinnenkamp)
pshastings@duke-energy.com (Peter Hastings)
RJB@NEI.org (Russell Bell)
RKTemple@cpsenergy.com (R.K. Temple)
roberta.swain@ge.com (Roberta Swain)
ronald.hagen@eia.doe.gov (Ronald Hagen)
sandra.sloan@areva.com (Sandra Sloan)
SauerB@BV.com (Robert C. Sauer)
sfrantz@morganlewis.com (Stephen P. Frantz)
sharon.lyons@ge.com
steven.hucik@ge.com (Steven Hucik)
steven.stark@ge.com (Steven Stark)
tom.miller@hq.doe.gov (Tom Miller)
trsmith@winston.com (Tyson Smith)
VictorB@bv.com (Bill Victor)
waraksre@westinghouse.com (Rosemarie E. Waraks)
wayne.marquino@ge.com (Wayne Marquino)
whorin@winston.com (W. Horin)