April 16, 2009

Mr. Jerald G. Head
Senior Vice President, Regulatory Affairs
GE Hitachi Nuclear Energy
3901 Castle Hayne Road MC A-18
Wilmington, NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 328 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Head:

By letter dated August 24, 2005, GE Hitachi Nuclear Energy 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 U.S. 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.

If you have any questions or comments concerning this matter, you may contact me at 301-415-3808 or zahira.cruz@nrc.gov, or you may contact Amy Cubbage at 301-415-2875 or amy.cubbage@nrc.gov.

Sincerely,

/RA/

Zahira Cruz Perez, 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

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Dear Mr. Head:

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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.

If you have any questions or comments concerning this matter, you may contact me at 301-415-3808 or zahira.cruz@nrc.gov, or you may contact Amy Cubbage at 301-415-2875 or amy.cubbage@nrc.gov.

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ESBWR/ABWR Projects Branch 1
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Enclosure:
Request for Additional Information
cc: See next page
Distribution: See next page

ADAMS ACCESSION NO. ML091030407 NRO-002

OFFICE	PM:NGE1:NRO	PM:NGE1:NRO
NAME	ZCruz Perez	ACubbage
DATE	04/15/09	04/16/09

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO.328 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION DATED APRIL 16, 2009

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Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD), Revision 5

RAI Number	Reviewer	RAI Summary	RAI Text
3.8-125 S01	Chakrabarti S	Quantitative evaluation to demonstrate that the spent fuel pool structure is adequate to withstand loads from the new free-standing fuel storage racks.	The staff reviewed GEH response transmitted in GEH letter MFN 09-183, dated March 17, 2009. Even though the response indicates that the evaluation of the spent fuel pool structure will be performed in the detail design phase, the staff still maintains that some assessment needs to be performed at this time during the design certification phase to demonstrate that the current design of the spent fuel pool structure is adequate to withstand the expected loads from the new free-standing fuel storage racks. The evaluation to be performed at this time should consider the effects of the revised spent fuel racks on the seismic analysis of the pool structure and fuel building, and the effects on the design of the pool structure. In addition, the potential localized impact loads on the pool concrete walls and floors, and the liner should be assessed. Therefore, the staff again requests GEH to perform a quantitative evaluation to demonstrate that the spent fuel pool structure is adequate to withstand loads from the new free-standing fuel storage racks.
3.9-254	Wu C	Additional information about PISYS computer code.	In ESBWR DCD Appendix 3D Section 3D.4.1, PISYS was listed as a computer code for the static and dynamic analyses of the piping systems. The PISYS program was validated against benchmark problems in NUREG/CR-1677 and Documented in Reference 3D-1 (NEDE-24210, "PISYS analysis of NRC Benchmark problems," dated August, 1979). However, Section 3D.4.1.2 noted that the PISYS07 was used for ESBWR piping analysis. PISYS07 was validated against benchmark problems in NUREG/CR-6049. GEH is requested to: (1) Explain why PISYS is described and listed in Appendix D in lieu of PISYS07 which is actually used for ESBWR piping analysis, (2) Discuss the differences between PISYS and PISYS07, (3) Clarify whether PISYS07 program is documented as part of the documentation for PISYS in Reference 3D-1 or elsewhere,

			(4) Confirm that PISYS and PISYS07 were both updated to incorporate methods and guides for response spectrum analysis and time history analysis in accordance with Regulatory Guide 1.92, Revision 2, published on July 2006 for ESBWR piping analysis (Ref. Section 3.7.3), (5) Confirm that results of PISYS07 (similar to PISYS) can be passed on to the ANSI7 runs via EZPYP computer program for performing the fatigue analysis of piping, (6) Clarify whether PISYS described in Section 3D.4.1 is the computer program in Reference 3D-1 where a 1979 version of PISYS was documented, and (7) Confirm whether the validation package for PISYS07 is available for the staff review. The information should include the author, source code, dated version, and facility; the program users manual and theoretical description, the extent and limitation of the program application; and the benchmarking problems, the QA control and maintenance of the program in accordance with 10CFR50 Appendix B and ASME NQA-1.
3.9-255	Wu C	Fatigue analysis including the environmental effects for piping and components in accordance with NRC Regulatory Guide 1.207 and NUREG/CR-6909.	ESBWR Tier 2 Rev. 5 Appendix 3D, Section 3D.4.2 states that ANSI7 computer program performs the fatigue analysis including the environmental effects for piping and components in accordance with NRC Regulatory Guide 1.207 and NUREG/CR-6909. GEH is requested to provide a summary of description of calculation on how the maximum stress intensity differences between two load sets were determined for the fatigue evaluation and on how the maximum strain rate was calculated for determining the environmental correction factor, Fen, in accordance with RG 1.207.

5.2-75	Wu C	Specify and document an acceptable Code, Code Editions and Addenda to be used for the design of ESBWR piping and components in accordance with the requirements of 10CFR50.55a.	ESBWR DCD Section 5.2.1.1, “Code Compliance with 10CFR50.55a” does not address the Code of record Edition and Addenda used for the design of the ESBWR Class 1, 2 and 3 piping and components. However, the 2001 Edition throughout and including 2003 Addenda of ASME Code was identified in DC Tier 2 Table 1.9-22 as the code of record. GEH noted in the table that all limitation and modifications specified in 10CFR50.55a are required to be met. However, staff notes that the 2001 Edition throughout and including the 2003 Addenda of ASME Code is excluded from the seismic design for piping by 10CFR50.55a (b)(1)(iii). GEH is requested to specify and document an acceptable Code, Code Editions and Addenda to be used for the design of ESBWR piping and components in accordance with the requirements of 10CFR50.55a. The staff notes that the code of record information is a Tier 2 information requiring NRC approval if the information must be changed in Tier 2 DCD FSAR, therefore it should be designated as Tier 2* information in the DCD.
3.12-3 S04	Hsu K	Provide justification to demonstrate that the selected piping system for ESBWR inside containment could be considered as representative for the ESBWR Class 1, 2, and 3 piping for all building. Clarification on the SRSS method.	Section 3.7.3.9 of ESBWR DCD stated that the independent support motion (ISM) response spectrum method of analysis combines responses of different support groups by the SRSS procedure for component and equipment and additional 10 percent margin for piping stress and piping support loads. Section II.9 of SRP 3.7.3 states that if the ISM method is utilized, all of the criteria presented in NUREG-1061 related to the ISM method must be followed. NUREG-1061 states that group responses for each direction should be combined by the absolute sum method. NUREG-1061 also states that unless the groups are from different structures or if from the same structure, they can be shown to be phase uncorrelated, then SRSS should be used. In RAI 3.12-3 S02, the staff requested the applicant to demonstrate that time histories from different support groups can be shown to be phase uncorrelated, and therefore, SRSS combination can be used. The applicant provided an alternative by performing a dynamic analysis for SSE earthquakes by two different procedures for two typical piping systems for ESBWR inside containment.

			The staff is requesting the applicant to provide justification to demonstrate that the selected piping system for ESBWR inside containment could be considered as representative for the ESBWR Class 1, 2, ad 3 piping for all building. The staff also notes that Figure B-3-5 of the GEH study report, MFN 06-119, Supplement 2, (ML072680480) showed phase correlation in the vertical direction. How does this justify the use of the SRSS method?
3.12-39	K. Hsu	Explain how the proposed mass spacing can satisfy the SRP 3.9.2 guidelines.	Section 3.7.3.3.1 of ESBWR DCD stated that mass points are located at spacing no greater than the span that would have a fundamental frequency equal to the cutoff frequency when calculated as a simply supported beam with uniformly distributed mass. Section II.2.A.(i)(2) of SRP 3.9.2 provided the following acceptable guidelines for the number of masses or degrees of freedom in dynamic modeling: • Use of an adequate number of masses or degrees of freedom in dynamic modeling to determine the response of all Category I and applicable non-Category I systems and plant equipment. The number is adequate when additional degrees of freedom do not result in more than a 10-percent increase in responses. • Alternately, the number of degrees of freedom may be taken as equal to twice the number of modes with frequencies less than 33 Hz (cut-off frequency). The staff is requesting GEH to explain how the GEH's proposed mass spacing can satisfy the SRP 3.9.2 guidelines.

cc:

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

Mr. Tom Sliva
7207 IBM Drive
Charlotte, NC 28262

DC GE - ESBWR Mailing List

Email

aec@nrc.gov (Amy Cubbage)
APH@NEI.org (Adrian Heymer)
art.alford@ge.com (Art Alford)
awc@nei.org (Anne W. Cottingham)
bevans@enercon.com (Bob Evans)
BrinkmCB@westinghouse.com (Charles Brinkman)
cberger@energetics.com (Carl Berger)
charles.bagnal@ge.com
charles@blackburncarter.com (Charles Irvine)
chris.maslak@ge.com (Chris Maslak)
CumminWE@Westinghouse.com (Edward W. Cummins)
cwaltman@roe.com (C. Waltman)
dan1.williamson@ge.com (Dan Williamson)
Daniel.Chalk@nuclear.energy.gov (Daniel Chalk
david.hinds@ge.com (David Hinds)
david.lewis@pillsburylaw.com (David Lewis)
David.piepmeyer@ge.com (David Piepmeyer)
donaldf.taylor@ge.com (Don Taylor)
erg-xl@cox.net (Eddie R. Grant)
Frostie.white@ge.com (Frostie White)
gcesare@enercon.com (Guy Cesare)
GEH-NRC@hse.gsi.gov.uk (Geoff Grint)
george.honma@ge.com (George Honma)
GovePA@BV.com (Patrick Gove)
greshaja@westinghouse.com (James Gresham)
gzinke@entergy.com (George Alan Zinke)
hickste@earthlink.net (Thomas Hicks)
hugh.upton@ge.com (Hugh Upton)
james.beard@gene.ge.com (James Beard)
james.gleason@ge.com (James Gleason)
jeff.waal@ge.com (Jeff Waal)
jerald.head@ge.com (Jerald G. Head)
Jerold.Marks@ge.com (Jerold Marks)
jgutierrez@morganlewis.com (Jay M. Gutierrez)
Jim.Kinsey@inl.gov (James Kinsey)
jim.riccio@wdc.greenpeace.org (James Riccio)
JJNesrsta@cpsenergy.com (James J. Nesrsta)
joel.Friday@ge.com (Joel Friday)
John.O'Neill@pillsburylaw.com (John O'Neill)
john.sorensen@ge.com (John Sorensen)
Joseph_Hegner@dom.com (Joseph Hegner)
junichi_uchiyama@mnes-us.com (Junichi Uchiyama)
kimberly.milchuck@ge.com (Kimberly Milchuck)
KSutton@morganlewis.com (Kathryn M. Sutton)

DC GE - ESBWR Mailing List

kwaugh@impact-net.org (Kenneth O. Waugh)
lchandler@morganlewis.com (Lawrence J. Chandler)
lee.dougherty@ge.com
lou.lanese@ge.com (Lou Lanese)
Marc.Brooks@dhs.gov (Marc Brooks)
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)
mike_moran@fpl.com (Mike Moran)
MSF@nei.org (Marvin Fertel)
mwetterhahn@winston.com (M. Wetterhahn)
nirsnet@nirs.org (Michael Mariotte)
PAC2@nrc.gov (Peter Cochran)
pareez.golub@ge.com (Pareez Golub)
patriciaL.campbell@ge.com (Patricia L. Campbell)
paul.gaukler@pillsburylaw.com (Paul Gaukler)
Paul@beyondnuclear.org (Paul Gunter)
peter.yandow@ge.com (Peter Yandow)
pshastings@duke-energy.com (Peter Hastings)
rick.kingston@ge.com (Rick Kingston)
RJB@NEI.org (Russell Bell)
RKTemple@cpsenergy.com (R.K. Temple)
Russell.Wells@Areva.com (Russell Wells)
sabinski@suddenlink.net (Steve A. Bennett)
sandra.sloan@areva.com (Sandra Sloan)
sara.andersen@ge.com (Sara Anderson)
SauerB@BV.com (Robert C. Sauer)
sfrantz@morganlewis.com (Stephen P. Frantz)
stephan.moen@ge.com (Stephan Moen)
steven.hucik@ge.com (Steven Hucik)
tdurkin@energetics.com (Tim Durkin)
timothy1.enfinger@ge.com (Tim Enfinger)
tom.miller@hq.doe.gov (Tom Miller)
trsmith@winston.com (Tyson Smith)
Vanessa.quinn@dhs.gov (Vanessa Quinn)
VictorB@bv.com (Bill Victor)
Wanda.K.Marshall@dom.com (Wanda K. Marshall)
wayne.cutright@ge.com (Wayne Cutright)
wayne.marquino@ge.com (Wayne Marquino)
whorin@winston.com (W. Horin)