June 17, 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. 352 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Head:

By letter dated August 24, 2005, GE Hitachi Nuclear Energy (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 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 301-415-3179 or Ilka.Berrios@nrc.gov or you may contact Amy Cubbage at 301-415-2875 or Amy.Cubbage@nrc.gov.

Sincerely,

/RA/

Ilka Berrios, 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

June 17, 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. 352 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Head:

By letter dated August 24, 2005, GE Hitachi Nuclear Energy (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 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 301-415-3179 or Ilka.Berrios@nrc.gov or you may contact Amy Cubbage at 301-415-2875 or Amy.Cubbage@nrc.gov.

Sincerely,

/RA/

Ilka Berrios, 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

Distribution: See next page

ADAMS ACCESSION NO. ML091680341

OFFICE	PM:NGE1	LPM:NGE1
NAME	IBerrios	ACubbage
DATE	06/17/09	06/17/09

OFFICIAL RECORD COPY

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 352 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION DATED JUNE 17, 2009

Distribution:
PUBLIC

Hard Copy
NGE1 R/F
IBerrios, NRO
ACubbage, NRO

E-Mail:
RidsNroDnrlNge1
RidsAcrsAcnwMailCenter
RidsOgcMailCenter
RidsNroDeCib2
EForrest, NRO
MSnodderly, NRO

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

RAI Number	Reviewer	Question Summary	Full Text
RAI 6.4-21 S01	Forrest E	CRHA Passive Cooling Calculation Audit issues	With respect to GEH's response to RAI 6.4-21, the staff has the following additional questions keyed to the GEH response items: 1. The use of a 15 ^{o}F temperature differential does not set an upper limit for satisfactory operator performance unless the starting temperature is identified. The EPRI URD does not identify a starting temperature or a basis for the statement that operators can tolerate the rise. In addition, humidity level is a key factor and there is no mention of a corresponding humidity with the 15 ^{o}F temperature rise. MIL STD 1472 F in the chart on page 122 identifies temperatures for limited tolerance hot zone. These temperatures are tied to exposure times. For an 8 hour shift, the value would be approximately 86 ^{o}F WBGT (Wet bulb globe temperature) which is an index that considers both wet bulb and dry bulb temperatures. This appears to be inconsistent with the ESBWR CRHA temperature profile although it is less than the ESBWR limiting temperature of 93 ^{o}F unless humidity is identified. The staff is unable to identify where it accepted MIL STD 1472 F guidance for another plant control room. The staff requests that GEH identify the plant. NIOSH 86-13 in section VIII discusses the basis for a Heat Stress standard. It reports that ACGIH, OSHA, the Armed Forces use 86 ^{o}F WBGT as a maximum temperature for light work. Remove the reference to ALWR URD (Vol. III, Chapter 9, Section 8.2.1.1). It applies to "Areas with Infrequent Inspection" of specific note "the work period will not exceed two hours before a 30 minute rest break is taken in a cool environment." This is not practical for CR operators. The threshold values presented do not apply. Consideration of air speed as presented is not applicable. Jets of hot unconditioned air at 80 fps directly on operators as presented in the response to RAI 9.4-29 do not increase operator cooling. The staff has supplemented RAI 9.4-29.

RAI Number	Reviewer	Question Summary	Full Text
			Show that the temperature profiled does not exceed 86 ^{o}F WBGT or justify the temperature profile if exceeds 86 ^{o}F WBGT during the 0-72 hour period as being acceptable for operator performance in a light work but highly stressful environment. Consider the fact that there is no acclimation to the temperature that some operators with health conditions may be more adversely impacted, and that time of exposure is important. 2. Post 72 hour cooling: This item is closed. 3. Lighting: Provide a comparison of the lighting level in the CRHA for normal and 0-72 hour emergency lighting in terms of light intensity (lumens) and state in the DCD the light intensity to be provided during the 0-72 hour LOCA/LOOP emergency operation and the anticipated power consumption. 4. Control Room Occupancy: This item is closed. 5. Accident Scenario-Non Safety Heat loads: This item is closed. 6. Thermal Properties of Concrete: Explain why the concrete characteristics assumed in the analysis are not conservative with respect to industry standards. Are the ESBWR concrete characteristic design values conservative with industry standards? Present a comparison of the concrete characteristics used in the analysis with the ESBWR design characteristics and the Industry standard concrete characteristics. What is the basis for any deviation of the ESBWR design values from industry standard concrete characteristics? The staff requested that GEH supply reference 5.7 of the passive cooling analysis. GEH has declined to provide the reference. Remove the reference from the passive cooling analysis and provide a statement that all information derived from this reference has been removed from the passive cooling analysis.

RAI Number	Reviewer	Question Summary	Full Text
			7. The staff acknowledges receipt of the compact disc with general arrangement drawings in pdf and dwg formats. The information used from these drawings will require confirmation with actual construction drawings or physical inspection in the plant. Create or identify an ITAAC that verifies that the actual construction is consistent with the information in the analysis. 8. Modeling Assumption: There does not appear to be a sufficient basis to accept a single node model for the CRHA in the passive cooling analysis. No mechanism has been established that demonstrates sufficient mixing occurs to justify using a uniform bulk temperature on the heat transfer surfaces as the driver for heat transfer. Inconsistent statements about stratification, mixing velocities, barriers to air flow in the CRHA and air supply locations from the EFU add doubt to the determination of a realistic temperature profile. The responses to RAI 9.4-29 original, supplement 1, supplement 2, and draft supplement 3 are not acceptable and draft supplement 3 will be supplemented if issued in its present form. Please provide a basis acceptable for the single node uniform temperature assumption in the analysis or redo the analysis with actual temperatures at the heat transfer surfaces. The staff is concerned since stratification occurs with very limited mixing that there would be the potential for significant differences between the bulk temperature and the localized temperature. The localized temperature is the temperature of concern for heat stress and equipment qualification issues. Demonstrate that the localized temperatures experienced by operators will not exceed a WBGT index of 86 ^{o}F and that the equipment qualification is based on the maximum localized temperature it will experience. Remove the reference to the ASHRAE Chapter 30 (actually 30.15) Heat Balance Method. While the most fundamental assumption is that the air in the thermal zone can be modeled as well mixed, there is no basis for saying that the air in the ESBWR CRHA is well mixed and thus making that assumption is not applicable.

RAI Number	Reviewer	Question Summary	Full Text
			The GOTHIC analysis model has not been received or reviewed by the staff and can not be commented on in this supplement. 9. Computer Model: The node diagram presented will be considered in the passive cooling evaluation. 10. Heat Sinks: The information presented is useful and will be considered in the passive cooling evaluation.

DC GE - ESBWR Mailing List (Revised 06/10/2009)

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)
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.marquino@ge.com (Wayne Marquino)
whorin@winston.com (W. Horin)