September 12, 2007

Mr. Joseph Savage
GE-Hitachi Nuclear Energy Americas LLC
Project Manager, ABWR Licensing
3901 Castle Hayne Road M/C J-70
Wilmington, NC 28402

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RELATED TO ADVANCED BOILING-WATER REACTOR LICENSING TOPICAL REPORT NEDO-33335 (TAC NO. MD5680)

Dear Mr. Savage:

By letter dated May 18, 2007, GE-Hitachi Nuclear Energy Americas LLC (GEH) submitted an Advanced Boiling-Water Reactor (ABWR) Licensing Topical Report (LTR) for the U.S. Nuclear Regulatory Commission's (NRC) review and approval for a change to the current ABWR certified design, NRC Docket No. 52-001. In order to complete its review, the NRC staff has determined that it will need responses to the enclosed request for additional information (RAI).

In order to support the review schedule, we request that you respond to this RAI within 30 days of receipt. If you are unable to respond within 30 days, please inform us in writing and propose an alternate schedule for responding. If you have any questions, I can be reached at (301) 415-4045 or by e-mail at met@nrc.gov.

Sincerely,

/RA/

Mark Tonacci, Senior Project Manager
ESBWR/ABWR Projects Branch 2
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-001

Enclosure:
As stated

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION
GE LICENSING TOPICAL REPORT NEDO-33335
ABWR PLANT MEDIUM VOLTAGE ELECTRICAL SYSTEM DESIGN

1. The revised medium voltage design does not meet the requirements in Commission Paper SECY-91-078 "EPRI's Requirements Document and Additional Evolutionary LWR Certification Issues," which are carried forth in the standard review plan. The requirement is that at least one offsite circuit to each redundant safety division should be supplied directly from one of the offsite power sources with no intervening non-safety buses. Furthermore, this will be done in such a manner that the offsite source can power the safety buses upon a failure of any non-safety bus. In the revised design the safety-related buses and non-safety-related buses are fed from the same transformer with an intervening non-safety bus between the transformer and the safety related bus. Please address this issue.

2. Provide the locations of stub buses A4, B4, C4, A5, B5, C5, etc. The staff is concerned about a fire propagating from the non-safety-related bus to the stub bus if the stub buses are located near the non-safety-related plant investment protection (PIP) buses.

3. In several sections, including Technical Specification Section 3.8.1 Required Action A.2, it is stated that the combustion turbine generator (CTG) will reach operational speed and voltage in less than 10 minutes. It is understood that there are breaker(s) which must be closed to provide power to the safety-related bus after the CTG is at rated speed and voltage. It is not clear if the CTG takes nearly 10 minutes to reach operational speed and voltage, how it will provide power to the safety-related bus within 10 minutes.

   - Please provide a description of how the CTG will power the buses within 10 minutes.

   - Also, modify the Bases Section to include a basis for the 10 minute requirement for the CTG to reach operational speed and voltage.

4. In Table 1C-1, under Article 50.63 (a)(1)(i) on page 1C-10, it is stated that "The current plant onsite emergency power sources include three (3) independent and redundant diesel generator (DG) divisions which are designed to supply approximately 7.2 MWe within 1 minute." Please clarify this statement. Does it mean the DGs are started and connected on the bus within a minute, or that necessary auto sequencing of loads are completed within a minute?

5. Section 8.1.2.2 on page 8.1-2 states that three non-Class 1E buses and one Class 1E division receive power from the single unit auxiliary transformer (UAT) assigned to each load group. Is this statement also valid for UAT C?

6. Section 8.2.1.1 on page 8.2-1, item (12) is modified to discuss the connection between the UATs and the 13.8 kV switchgear, and the connection between the UATs to the PIP switchgear. Please provide a discussion regarding the connection type (i.e., non-segregated phase bus or cable bus) between the PIP switchgear and the stub bus, and between the stub bus and the safety-related switchgear.

7. Section 8.2.1.1 on page 8.2-1, item (13) indicates that there will be power cables from the reserve auxiliary transformers to the input terminals of the non-safety-related medium voltage (4.16 kV) switchgear.

   - Should power cables be cable bus?

   - For clarity, should 6.9 kV be replaced as 13.8 kV and 4.16 kV? (This question is applicable throughout the document.)

8. Section 8.2.1.1 on page 8.2-2, item (14) is confusing as modified. Please describe more specifically where the power cables are used after leaving the CTG.

9. Section 8.2.1.2 on page 8.2-3, states that the generator circuit breaker provided is capable of interrupting symmetrical and asymmetrical fault current of 440 kA momentary at 5 cycles after initiation of the fault.

   - Please explain why the symmetrical and asymmetrical fault current values are the same.

   - Is there any problem of obtaining a breaker with such high interrupting current capability?

10. Please clarify on page 8.2-4, insert B, whether the tap changers for the reserve auxiliary transformers are manual or automatic. The UAT tap changers are automatic per insert A.

11. In Section 8.2.1.3 on page 8.2-5, the last sentence reads “The alternate preferred power feed turns down between the Control and Reactor Building and enters.” As modified the sentence is incomplete. Please modify appropriately.

12. For Section 8.2.2.1 on page 8.2-7, provide a discussion of how the ABWR offsite power system design will meet GDC 2 and 4 as discussed in Standard Review Plan Section 8.2, Revision 4.

13. Section 8.2.5 included main transformer and reserve auxiliary transformer ratings. Please include unit auxiliary transformer ratings and tap changer information (automatic or manual).

14. Section 8.3.1.0.1 on page 8.3-2, the modified last paragraph states that “The non-Class 1E and the Class 1E switchgear interrupting ratings are chosen to be capable of clearing maximum expected fault current. The steady state ratings are chosen to carry the maximum expected normal currents. The 13.8 kV/4.16 kV switchgear is respectively rated at 15kV/4.76kV.”

    - This section should discuss the non-Class 1E distribution system. The Class 1E distribution system should be discussed in Section 8.3.1.1.1.

    - It is not clear what is meant by steady state ratings, please address.

    - The staff suggests retaining the last sentence of the original write-up “Instrumentation and control power is from the non-Class 1E, 125 VDC power system.”

15. On page 8.3-44, item (c) originally stated that the V2 raceway was for high level signal and control. As revised, high level signal and control cables no longer appear to be included in the described raceway system.

    - Please provide a basis for not including these cables.

    - Additionally, please verify that power cables (V3) are routed in flexible metallic conduit under the raised floor of the control room (refer to last paragraph of Item (4)).

16. In the technical specification (TS) section, on TS page 3.8-11, the surveillance requirement (SR) 3.8.1.9, gives a fixed power factor of $\leq$0.9.

    - Please provide the basis for a fixed power factor of 0.9. The staff believes that the power factor should be the design load power factor.

    - For SR 3.8.1.9.a, the frequency value is missing. Please provide this value.

17. In the TS section, on TS page 3.8-11, SR 3.8.1.10 gives a fixed power factor of $\leq$ 0.9.

    - Please provide the basis for fixed power factor of 0.9. As noted above, the staff believes that the power factor should be the design load power factor.

    - This DG surveillance appears to be incorrect as written: "Verify each DG operating at a power factor $\leq$0.9 does not trip and voltage is maintained ≤[ ] V during and following a load rejection of a load ≥ [5000] V and ≤ [ ] kW." The staff believes that because the design power factor is not yet known it should be in brackets and the rejection load range should be in kW. The staff believes the sentence should read: "Verify each DG operating at a power factor ≤ [0.9] does not trip and voltage is maintained ≤ [5000] V during and following a load rejection of a load ≥ [7200] kW and ≤ [9000] kW." Please address this surveillance requirement.

18. In Section 8.2.3 (page 8.2-9), it is stated that the normal steady state frequency of the offsite transmission network shall be within plus or minus 2 hertz of 60 Hz. Pump flow will be reduced for reduced frequency. Is the frequency variation considered in the accident analysis?

19. In the TS section, on TS page 3.8-17, SR 3.8.1.19, the DG surveillance verifies that DG frequency is ≥ [58.8] Hz and ≤ [61.2] Hz. Pump loading is proportional to the cube of speed and hence the cube of frequency. Please confirm that the design properly considered the effect of increased frequency on pump loading.

20. In Section 8.1.2.1 on page 8.1-2 in the last paragraph, it states that the CTG is capable of providing power to non-Class 1E plant investment protection buses and Class 1E buses. However, the CTG is also capable of providing power to non-class 1E 13.8 kV buses. Please modify the statement accordingly.

cc:

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

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

Email

APH@NEI.org (Adrian Heymer)
awc@nei.org (Anne W. Cottingham)
bennettS2@bv.com (Steve A. Bennett)
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)
david.lewis@pillsburylaw.com (David Lewis)
dlochbaum@UCSUSA.org (David Lochbaum)
frankq@hursttech.com (Frank Quinn)
george.honma@ge.com (George Honma)
george.stramback@gene.ge.com (George Stramback)
GovePA@BV.com (Patrick Gove)
greshaja@westinghouse.com (James Gresham)
gzinke@entergy.com (George Alan Zinke)
jcurtiss@winston.com (Jim Curtiss)
jgutierrez@morganlewis.com (Jay M. Gutierrez)
jim.riccio@wdc.greenpeace.org (James Riccio)
JJNesrsta@cpsenergy.com (James J. Nesrsta)
john.o'neil@pillsburylaw.com (John O'Neil)
Joseph.savage@ge.com (Joseph Savage)
Joseph_Hegner@dom.com (Joseph Hegner)
KSutton@morganlewis.com (Kathryn M. Sutton)
kwaugh@impact-net.org (Kenneth O. Waugh)
lynchs@gao.gov (Sarah Lynch - Meeting Notices Only)
maria.webb@pillsburylaw.com (Maria Webb)
mark.beaumont@wsms.com (Mark Beaumont)
matias.travieso-diaz@pillsburylaw.com (Matias Travieso-Diaz)
media@nei.org (Scott Peterson)
mike_moran@fpl.com (Mike Moran)
nirsnet@nirs.org (Michael Mariotte)
patriciaL.campbell@ge.com (Patricia L. Campbell)
paul.gaukler@pillsburylaw.com (Paul Gaukler)
Paul@beyondnuclear.org (Paul Gunter)
Petrovb@westinghouse.com (Bojan Petrovic)
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)
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)