April 20, 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. 331 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 enclosures to this letter.

If you have any questions or comments concerning this matter, you may contact me at 301-415-2375 or leslie.perkins@nrc.gov, or you may contact Amy Cubbage at 301-415-2875 or amy.cubbage@nrc.gov.

Sincerely,

/RA/

Leslie Perkins, Project Manager
ESBWR/ABWR Projects Branch 1
Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosures:
1. Request for Additional Information
2. Examples

cc: See next page

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Division of New Reactor Licensing
Office of New Reactors

Docket No. 52-010

Enclosure:
1. Request for Additional Information
2. Examples

cc: See next page
Distribution: See next page
ADAMS ACCESSION NO. ML091050161 NRO-002

OFFICE	PM:NGE2:NRO	PM:NGE1:NRO
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DATE	4/15/09	4/20/09

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO.331 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION DATED APRIL 20, 2009

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

RAI Number	Reviewer	Question Summary	Full Text
16.2-101 S01	Harbuck C	Applicability of GTS 3.9.6 should match BWR/6 and ABWR	After further consideration, and the fact that ABWR GTS 3.9.6, "RPV Water Level," and BWR/6 STS 3.9.6, "RPV Water Level - [Irradiated fuel]" both include an Applicability of <u>ABWR</u> During movement of new fuel assemblies or handling of control rods within the RPV, when irradiated fuel assemblies are seated within the RPV. <u>BWR/6</u> [During movement of new fuel assemblies or handling of control rods within the [RPV], when irradiated fuel assemblies are seated within the [RPV].] GEH should restore this Applicability condition to ESBWR GTS 3.9.6, "RPV Water Level." The fuel handling accident (FHA) analysis for ABWR and BWR/6 both assume dropping irradiated fuel in the RPV, just like the ESBWR. So potential radiological consequences of the FHA would bound the consequences of dropping a new fuel assembly or a control rod on irradiated fuel in the RPV. GEH's proposal to omit this Applicability condition from ESBWR GTS 3.9.6 may have merit, but doing so would depart from STS for BWR/6. Lacking an ESBWR-design specific basis for this omission, CTSB will not agree to it unless an STS generic change request is submitted to NRR by GEH through the TSTF using the TSTF traveler process, and approved by NRR. Therefore, GEH should restore

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			this Applicability condition to ESBWR GTS 3.9.6, consistent with the STS 3.9.6 Bases Background, Applicable Safety Analyses, and Applicability Sections: BACKGROUND The movement of ~~[irradiated]~~ fuel assemblies ~~[~~or handling of control rods~~]~~ within the RPV requires a minimum water level of [22 ft 8 inches] above the top of the RPV flange. APPLICABLE SAFETY ANALYSES During movement of ~~[irradiated]~~ fuel assemblies ~~[~~or handling of control rods~~]~~ the water level in the RPV is an initial condition design parameter in the analysis of a fuel handling accident in containment postulated by Regulatory Guide 1.25 (Ref. 1). APPLICABILITY LCO 3.9.6 is applicable when moving ~~[irradiated]~~ fuel assemblies ~~[~~or handling control rods (i.e., movement with other than the normal control rod drive)~~]~~ within the RPV. The LCO minimizes the possibility of a fuel handling accident in containment that is beyond the assumptions of the safety analysis. ~~[~~If irradiated fuel is not present within the RPV, there can be no significant radioactivity release as a result of a postulated fuel handling accident.~~]~~ ~~[Requirements for handling of new fuel assemblies or control rods (where water depth to the RPV flange is not of concern) are covered by LCO 3.9.7, "RPV Water Level - New Fuel or Control Rods."]~~ Requirements for fuel handling accidents in the spent fuel storage pool are covered by LCO 3.7.7, "Fuel Pool Water Level."

RAI Number	Reviewer	Question Summary	Full Text
			----------REVIEWER'S NOTE---------- LCO 3.9.6 is written to cover new fuel and control rods as well as irradiated fuel. ~~If a plant adopts LCO 3.9.7, however, the second bracketed portion of this Applicability is adopted in lieu of the first bracketed portion. Additional modifications would also be made to the title and Required Action A.1.~~ ----------
16.2-156 S03	Harbuck C	Content of Specification 5.5.11, "Setpoint Control Program," and associated Reviewer's Note.	In consideration of the response to RAI 16.2-156 supplement 2, the applicant is requested to revise the proposed setpoint control program specification by adopting the model specification and reviewer's note provided in Enclosure 2. It is the staff's position that this will be necessary for the staff to conclude that the SCP satisfies 10 CFR 50.36(c)(1)(ii)(a). In particular, the reviewer's note should direct that (1) the guidance related to establishing the limiting as-found setting value (the AFT) and (2) the requirement to trend and evaluate differences between each as-found setting and either the previous as-left value or the specified $NTSP_F$, either be included in the SCP Specification, or be incorporated into the NRC-approved methodology. The latter requirement should include trending and evaluation of all as-found settings, not just those outside the AFT. The requirement that changes to instrumentation settings be governed by 10 CFR 50.59, in addition to the approved methodology, has been restored to the SCP model. The requirement that the document required by [5.5.11.d] contain a "record of changes" is removed, since regulations already require appropriate record keeping. In paragraph 5.5.11.c.1.i of the SCP model, the phrase "evaluated to verify that it is functioning in accordance with its design basis" is retained, and in paragraph 5.5.11.c.1.ii, the phrase "then until 5.5.11.c.1.i and 5.5.11.c.2 are met" is deleted. These changes are necessary to ensure that an instrument channel that is found with a setting that is non-conservative compared to the AV will not be declared OPERABLE based solely upon

RAI Number	Reviewer	Question Summary	Full Text
			entering this condition into the plant's corrective action program for dispositioning at some later time. Also, it is not necessary to explain in the SCP Specification how to restore a channel to OPERABLE status
16.2-188	Harbuck C	Shutdown requirements for isolation condenser operability and available methods of decay heat removal.	The staff requests GEH to revise ACTION A of ESBWR generic TS 3.5.5 with enhanced remedial actions to provide greater assurance that in the event of a loss of offsite power with no OPERABLE ICS trains, a non-safety decay heat removal method will be available. This will reduce the probability that the GDCS (as required by LCO 3.5.3) and the ADS system (as required by SR 3.5.3.1) will be challenged to provide a means of decay heat removal. The suggested remedial actions reflect consideration of the ACTIONS of BWR/6 STS 3.4.10, "RHR Shutdown Cooling System – Cold Shutdown," and ABWR generic TS 3.4.8, "RHR Shutdown Cooling System – Cold Shutdown." The staff suggests that the ACTIONS and ACTION A be revised as shown in Enclosure 2; suitable changes should also be made to the bases. Note that "verify' is preferable to "ensure" in stating required actions. The bases for ESBWR generic TS should state that two acceptable methods of decay heat removal include the following combinations, in order of preference, with each method supported by a separate available onsite AC electrical power source: 1. Two RWCU/SDC subsystems (each subsystem supported by its own RCCWS and PSWS subsystems, i.e., having same onsite AC power source) in SDC mode (MODE 5 flow path for each subsystem: either or both suction locations from RPV, bypass RHX, through NRHX, through either pump, bypass demineralizer, bypass RHX, feedwater loop "A" or "B" for subsystem "B" or "A", respectively, and return to RPV via feedwater sparger. In MODE 4, flow may need to go through the RHX to ensure acceptable temperature for pump operation.)

RAI Number	Reviewer	Question Summary	Full Text
			2. RWCU/SDC subsystem “A” in SDC mode, and FAPCS subsystem “B” (each subsystem supported by its own RCCWS and PSWS subsystems, i.e., having same onsite AC power source). In this combination, both feedwater loops would be utilized. RWCU/SDC subsystem “A” would use feedwater loop “B” and FAPCS subsystem “B” would use feedwater loop “A”. The FAPCS subsystem “B” is aligned to operate in the Alternate Shutdown Cooling (ASDC) mode (as described on DCD Tier 2 Section 9.1.3.2, on page 9.1-16): Water is drawn from the suppression pool, cooled and then discharged back to the reactor vessel via the LPCI injection flow path (via RWCU/SDC loop “B” and then Feedwater loop “A”). The warmer water in the reactor vessel rises and then overflows into the suppression pool via two opened safety-relief valves on the main steam lines, completing a closed loop for this mode operation. The FAPCS ASDC mode may also be used in MODE 4 provided suppression pool temperature remains acceptable for pump operation. 3. RWCU/SDC subsystem “B” in SDC mode and FAPCS subsystem “A” in ASDC mode – same as combination 2, but only feedwater loop “A” would be used. 4. Two FAPCS subsystems (each subsystem supported by its own RCCWS and PSWS subsystems, i.e., having same onsite AC power source) aligned to operate in the Alternate Shutdown Cooling (ASDC) mode – in this combination, only feedwater loop “A” would be used. Other combinations of non-safety systems with independent onsite AC electrical power sources that can perform the decay heat removal function may also be listed. However, if Required Action A.1 or A.2 cannot be met, then Condition B would be entered, which would ensure closure of the

RAI Number	Reviewer	Question Summary	Full Text
			reactor building or OPERABILITY of the reactor building isolation function as a precaution to mitigate a total loss of active non-safety-system methods of decay heat removal in MODE 4 or 5, while no ICS trains are OPERABLE.

5.0 ADMINISTRATIVE CONTROLS

5.5 Programs and Manuals

The following programs shall be established, implemented, and maintained.

5.5.11 Setpoint Control Program (SCP)

a. The Setpoint Control Program (SCP) implements the regulatory requirement of 10 CFR 50.36(c)(1)(ii)(A) that technical specifications will include items in the category of limiting safety system settings (LSSS), which are settings for automatic protective devices related to those variables having significant safety functions.

b. The Limiting Trip Setpoint (LTSP), Nominal Trip Setpoint ($NTSP_F$), Allowable Value (AV), As-Found Tolerance (AFT), and As-Left Tolerance (ALT) for each Technical Specification required automatic protection instrumentation function shall be calculated in conformance with the instrumentation setpoint methodology previously reviewed and approved by the NRC in NEDE-33304P-A, "GEH ABWR/ESBWR Setpoint Methodology," [Revision #, dated Month dd, yyyy, (MLxxxxxxxxx)], and the conditions stated in the associated NRC safety evaluation, [Letter to GEH from NRC, Title, dated Month, dd, yyyy, (MLxxxxxxxxx)].

c. For each Technical Specification required automatic protection instrumentation function, performance of a CHANNEL CALIBRATION surveillance shall include the following:

   1. The as-found value of the instrument channel trip setting shall be compared with the previous as-left value or the specified $NTSP_F$.

      i. If the as-found value of the instrument channel trip setting differs from the previous as-left value or the specified $NTSP_F$ by more than the pre-defined test acceptance criteria band (i.e., the specified AFT), then the instrument channel shall be <u>evaluated to verify that it is functioning in accordance with its design basis</u> before declaring the surveillance requirement met and returning the instrument channel to service. This condition shall be dispositioned by the plant's corrective action program.

      ii. If the as-found value of the instrument channel trip setting is less conservative than the specified AV, ~~then until 5.5.11.c.1.i and 5.5.11.c.2 are met,~~ the surveillance requirement is not met and the instrument channel shall be immediately declared inoperable.

2. The instrument channel trip setting shall be set to a value within the specified ALT around the specified $NTSP_F$ (a trip setting as or more conservative than the specified LTSP) at the completion of the surveillance; otherwise, the surveillance requirement is not met and the instrument channel shall be immediately declared inoperable.

3. If the as-found value is compared with the specified $NTSP_F$ to meet 5.5.11.c.1, the following conditions apply:

   i. the setting tolerance band (the specified ALT) must be less than or equal to the square root of the sum of the squares of reference accuracy, measurement and test equipment, and readability uncertainties;

   ii. the setting tolerance band (the specified ALT) must be included in the total loop uncertainty; and

   iii. the pre-defined test acceptance criteria band (the specified AFT) for the as-found value must include either the setting tolerance band (the specified ALT) or the uncertainties associated with the setting tolerance band (the specified ALT), but not both of these.]

[d.] The difference between the instrument channel trip setting as-found value and either the previous as-left value or the specified $NTSP_F$, for each Technical Specification required automatic protection instrumentation function shall be trended and evaluated to verify that the instrument channel is functioning in accordance with its design basis.]

[e.] The SCP shall establish a document containing the current values of the specified LTSP, $NTSP_F$, AV, AFT, and ALT for each Technical Specification required automatic protection instrumentation function, and references to the calculation documentation. Changes to this document shall be governed by the regulatory requirements of 10 CFR 50.59. In addition, changes to the specified LTSP, $NTSP_F$, AV, AFT, and ALT values shall be governed by the approved setpoint methodology. This document including any midcylce revisions or supplements shall be provided upon issuance for each reload cycle to the NRC.

COL Item	Description	Reviewer's Note
5.5.11-1	Setpoint Control Program Methodology and Implementation	The referenced NRC approved setpoint methodology and the specified setpoint control program (SCP) shall meet the following guidance, and shall be applicable to Technical Specification required automatic protection instrumentation function surveillances that require verification that setpoints (or channel outputs) are within the necessary range and accuracy (e.g., CHANNEL CALIBRATIONS): 1. The methodology allows little variation in the values calculated by different analysts using identical input values (such as uncertainties and channel calibration drift). 2. The as-left value of the instrument channel trip setting shall be the value at which the channel was set at the completion of the surveillance with no additional adjustment of the instrument channel. 3. The as-found value of the instrument channel trip setting shall be the trip setting value measured during the subsequent performance of the surveillance before making any adjustment to the instrument channel that could change the trip setting value. 4. The bracketed requirements specified by 5.5.11.c.3 with brackets removed shall be either retained in the SCP Specification, or incorporated into the referenced NRC-approved setpoint methodology. 5. The bracketed requirements specified by 5.5.11.d with brackets removed shall be either retained in the SCP Specification, or incorporated into the referenced NRC-approved setpoint methodology.

Example ACTIONS for ESBWR Generic TS 3.5.5 (RAI 16.2-188)

ACTIONS

----------NOTE----------

Separate Condition entry is allowed for each ICS train.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two required ICS trains inoperable.	A.1 Verify two methods of decay heat removal are available, with each method supported by a separate available onsite AC electrical power source.	1 hour AND Once per 24 hours thereafter
	AND	
	A.2 Verify at least one method of decay heat removal is in operation.	1 hour AND Once per 12 hours thereafter
	AND	
	A.3 Monitor reactor coolant temperature and pressure.	Once per hour

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