

September 11, 2009

Mr. Jerald G. Head
Senior Vice President, Regulatory Affairs
GE Hitachi Nuclear Energy
3901 Castle Hayne Road MC A18
Wilmington, NC 28401

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 367 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 301-415-2375 or leslie.perkins@nrc.gov, or you may contact Amy Cabbage at 301-415-2875 or amy.cabbage@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

Enclosure:
Request for Additional Information

cc: See next page

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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 301-415-2375 or leslie.perkins@nrc.gov, or you may contact Amy Cubbage at 301-415-2875 or amy.cubbage@nrc.gov.

Sincerely,

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Leslie Perkins, 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. ML092540105 NRO-002

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO.367 RELATED TO
ESBWR DESIGN CERTIFICATION APPLICATION DATED SEPTEMBER 11,
2009

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

RAI Number	Reviewer	Question Summary	Full Text
16.2-50 S02	Harbuck C Forrest E	GEH is requested to either justify the 60-month Frequency of GTS SR 3.6.3.1.5, or change it to 24 months and also change the associated bases to be consistent with the bases for the Frequency of STS SR 3.6.4.1.5.	The staff requested GEH to provide additional justification, other than "engineering judgment," for the 60-month Frequency of Surveillance Requirement (SR) 3.6.3.1.5, to verify Reactor Building exfiltration rate within limits. The staff did not find that GEH's response (MFN 07-022) to RAI 16.2-50 provided sufficient justification for the 60-month Frequency. Reactor Building integrity inspections and a lack of a standby gas treatment (SGT) system to automatically filter the atmosphere of the ESBWR Reactor Building Contaminated Area Ventilation Subsystem (CONAVS) area following a design basis accident are not justifications for only verifying the Reactor Building CONAVS area exfiltration rate within limits once per 60 months (potentially up to 75 months between consecutive tests). Therefore, GEH is requested to either provide additional justification, other than "engineering judgment," for the 60-month Frequency, or revise the Frequency of GTS SR 3.6.3.1.5 to 24 months, and strengthen the bases to be consistent with the bases for the cyclic Frequency of the equivalent surveillance for secondary containment boundary integrity in BWR/4 and BWR/6 standard TS SR 3.6.4.1.5: "Operating experience has shown the [secondary] containment boundary usually passes these Surveillance[s] when performed at the [18] month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint."
16.2-189	Harbuck C	Add LCO for expansion pool-to-equipment cross-connect valves	GEH is requested to revise the GTS by adding an LCO to explicitly require operability of (1) the safety-related IC/PCCS inner expansion pool level - low instrumentation function channels, and (2) the safety-related actuation [logic] function divisions, that actuate to open the IC/PCCS pool inner expansion pool-to-equipment pool cross-connect valves on low level in at least one inner expansion pool.

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			<p>GEH is also requested to revise the GTS and bases by adding (1) a LSFT SR for these safety-related actuation [logic] function divisions, (2) appropriate action requirements for both the inner expansion pool level instrument channels and expansion pool-to-equipment pool cross-connect actuation divisions, and (3) appropriate bases for the LCO, Actions, and SRs, including the overlap of the LSFT with tests of the valve initiators on an actual or simulated automatic initiation signal.</p> <p>GTS SR 3.7.1.8 verifies actuation of each of the four IC/PCCS pool inner expansion pool to equipment pool cross-connect valves on an actual or simulated automatic initiation signal. The bases of SR 3.7.1.8 state that this SR overlaps the Logic System Functional Test (LSFT) required by GTS SR 3.3.8.1.4 for DPS Function 4.a, IC/PCCS Pool Expansion Pool to Equipment Pool Cross-Connect – Actuation, IC/PCC System Pool Level - Low, to provide complete testing of the assumed safety function. However, the generic TS include no LCO or LSFT SR for the safety-related action logic function associated with the safety-related initiators on the cross-connect valves. Also, SR 3.5.4.5, which overlaps the LSFT of SR 3.3.5.4.1, does not appear to address the safety-related initiators for opening the cross-connect valves.</p>

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16.2-190	Harbuck C	Identification of ESBWR PAM instruments	<p>The standard technical specifications (STS) for boiling water reactors (BWRs) include a specification, STS 3.3.3.1, to govern post-accident monitoring (PAM) instrumentation. The bases for STS 3.3.3.1, which is based on Regulatory Guide 1.97, Revision 3, state:</p> <p style="padding-left: 40px;">PAM instrumentation that meets the definition of Type A in Regulatory Guide 1.97 satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii). Category 1, non-Type A, instrumentation is retained in the Technical Specifications because it is intended to assist operators in minimizing the consequences of accidents. Therefore, these Category 1, non-Type A variables are important for reducing public risk.</p> <p>STS 3.3.3.1 contains a Reviewer's Note for applicants or licensees who propose to incorporate STS 3.3.3.1 into their plant's technical specifications. The Note requires replacing the bracketed list of PAM functions in STS Table 3.3.3.1-1 with a list of all Regulatory Guide 1.97 Type A instruments, and the Category 1, non-Type A instruments specified in the plant's Regulatory Guide 1.97 Safety Evaluation Report.</p> <p>STS 3.3.3.1 and bases, and the STS Table 3.3.3.1-1 Reviewer's Note are based on the May 9, 1988, T.E. Murley (NRC) to R. F. Janecek (BWR Owners' Group) letter, which presented the NRC staff position regarding which accident monitoring instrumentation must be in technical specifications. This letter is known as the "Split Report."</p> <p>The staff has reviewed its current position, as stated in the STS Reviewer's Note, regarding which accident monitoring instrumentation should be in technical specifications, in comparison to Regulatory Guide 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," Revision 4, June 2008. It is the NRC staff's position that technical</p>

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			<p>specifications should include (1) all Regulatory Guide 1.97, Revision 4, Type A instruments, and (2) all Regulatory Guide 1.97, Revision 4, Type B and Type C instruments in accordance with the units Regulatory Guide 1.97 Safety Evaluation Report. Therefore, a COL applicant should include a technical specification that meets this staff position if the applicant references Regulatory Guide 1.97, Revision 4.</p> <p>Identification of Regulatory Guide 1.97, Revision 4, Type A, Type B, and Type C accident monitoring instrumentation functions depends on development of emergency operating procedures (EOPs) and abnormal operating procedures (AOPs), which is a post-COL activity. Therefore COL applicants implementing Regulatory Guide 1.97, Revision 4, should use guidance from DC/COL-ISG-8, "Necessary Content of Plant-Specific Technical Specifications When a Combined License Is Issued," December 2008, in order to complete the plant-specific technical specification list of PAM instrumentation functions. This guidance provides three options:</p> <ul style="list-style-type: none"> • Option 1 involves the use of plant-specific information. Option 1 appears impracticable for PAM instrumentation technical specifications because the list of Type A, Type B, and Type C PAM instrumentation functions cannot be finalized before COL issuance. • Option 2 involves the use of useable bounding information. Option 2 may be practical if the COL applicant is able to develop a truly bounding list of Type A, Type B and Type C PAM instrumentation functions to be included in the plant-specific technical specifications. (The staff recognizes that the ESBWR likely has no Regulatory Guide 1.97, Revision 4, Type A instruments because of its passive design.) However, if a Regulatory Guide 1.97, Revision 4, analysis considering plant-specific EOPs and AOPs, which are based on the as-built plant,

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			<p>shows that additional PAM instrumentation functions are necessary, then the COL holder would need to request a license amendment to make changes to the plant-specific technical specification PAM instrumentation required functions list. The NRC would need to approve this amendment before the COL holder would be allowed to load fuel.</p> <ul style="list-style-type: none"> Option 3 involves an administrative program to control PAM instrumentation functions. Option 3 would require establishing a plant-specific administrative controls program technical specification that would require using an NRC-approved methodology to determine the required PAM instrumentation functions, and maintaining the list of required PAM instrumentation functions in a specified document with appropriate regulatory controls. Option 3 may be practical because the approved methodology, Regulatory Guide 1.97, Revision 4, is already established, and DCD Section 7.5.1 already commits the COL holder to establish a separate document that lists all types of PAM instrumentation. This approach is advantageous because COL holders would not necessarily need to request a license amendment to make changes to the PAM instrumentation required functions list post COL. However, the program technical specification would need to be developed prior to COL issuance. <p>As noted above, NRC staff has concluded that accident monitoring instrumentation Type B and Type C, as defined Regulatory Guide 1.97, Revision 4, are similar to the Category 1 type defined in Regulatory Guide 1.97, Revision 3. Since standard technical specifications (STS) for boiling water reactors (BWRs) include a technical specification to govern post-accident monitoring (PAM) instrumentation, the staff requests the applicant to include requirements for PAM instrumentation in the ESBWR generic technical specifications. The staff</p>

RAI Number	Reviewer	Question Summary	Full Text
			<p>believes the following is an option for such a set of generic technical specification requirements:</p> <ol style="list-style-type: none"> <li data-bbox="930 435 1906 602">(1) Revise Generic Technical Specification 3.3.3.2, "Post-Accident Monitoring (PAM) Instrumentation," to include a table that specifies the required PAM functions (Table 3.3.3.2-1). The specified PAM functions should be consistent with BWR/6 Standard Technical Specification Table 3.3.3.1-1. <li data-bbox="930 639 1906 807">(2) Change the location of the brackets for Generic Technical Specification 3.3.3.2, which are associated with combined license (COL) Item 3.3.3.2-1 in DCD Table 16.0-1-A, to only include Generic Technical Specification Table 3.3.3.2-1, which contains the list of required PAM functions. <li data-bbox="930 844 1906 937">(3) Remove the brackets from Generic Technical Specification 5.6.5, "Post Accident Monitoring Report," and delete COL Item 5.6.5-1 from DCD Table 16.0-1-A. <li data-bbox="930 974 1906 1273">(4) Revise the Reviewer's Note for COL Item 3.3.3.2-1 in DCD Table 16.0-1-A to be consistent with Regulatory Guide 1.97, Revision 4, and the reviewer's note for STS Table 3.3.3.1-1. Also revise the Reviewer's Note by adding a second note to explain that in lieu of the table listing the PAM functions in the technical specifications, a COL applicant may adopt Specification 5.5.14 (as noted in item 9 below). Establish new COL Item 5.5.14-1 in DCD Table 16.0-1-A and repeat this second note with it. <li data-bbox="930 1310 1906 1377">(5) Revise Generic Technical Specification Limiting Condition for Operation (LCO) 3.3.3.2 to state:

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			<p>Two channels of each Type A, B, and C PAM Instrumentation Function associated with the DC and Uninterruptible AC Electrical Power Distribution Divisions required by LCO 3.8.6, "Distribution Systems - Operating," shall be OPERABLE.</p> <p>(6) Revise Generic Technical Specification 3.3.3.2 Conditions A and B to state:</p> <p>A. One or more required Type A PAM Functions with one required channel inoperable.</p> <p>B. One or more required Type A PAM Functions with two required channels inoperable.</p> <p>(7) Revise Availability Control 3.3.4 to address PAM instrumentation not required by revised Generic Technical Specification 3.3.3.2.</p> <p>(8) Make suitable conforming changes to the bases for Generic Technical Specification 3.3.3.2, consistent with the bases for STS 3.3.3.1. The LCO section of the bases for Generic Technical Specification 3.3.3.2 should contain bracketed discussions of the specified Type A, Type B, and Type C PAM instrumentation functions. Revise the Background and the Applicable Safety Analysis sections of the bases to also include discussions of Type B and Type C PAM instrumentation functions.</p> <p>(9) Establish a bracketed new specification in Generic Technical Specification Section 5.5 similar to the following model. This would enable COL applicants to choose Option 3 of DC/COL-ISG-8 to complete the technical specifications for PAM instrumentation without having to obtain an exemption from the generic technical specifications.</p> <p>The following programs shall be established, implemented, and</p>

RAI Number	Reviewer	Question Summary	Full Text
			<p data-bbox="1031 337 1182 363">maintained.</p> <p data-bbox="1031 407 1146 467"><u>[5.5.14 Program</u></p> <p data-bbox="1226 407 1850 433"><u>Post-Accident Monitoring (PAM) Instrumentation</u></p> <p data-bbox="1220 505 1902 971">This program provides controls to establish accident monitoring instrumentation functions that are required by Specification 3.3.3.2, "Post-Accident Monitoring (PAM) Instrumentation." These instrumentation functions shall be those designated as Type A, B, and C, as defined in Regulatory Guide (RG) 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," Revision 4, June 2006, and shall be listed in the PAM function list document as described in FSAR Section 7.5.1. Changes to the list of Type A, B, and C functions shall be made in accordance with the provisions of 10 CFR 50.59 and RG 1.97, Revision 4.]</p> <p data-bbox="936 1008 1885 1138">(10) Revise the Actions of Generic Technical Specification 3.3.3.2 to be consistent with the BWR/6 STS 3.3.3.1 Actions, which require placing the unit in Mode 3 within 12 hours if two required channels of certain PAM functions are inoperable for more than 7 days.</p> <p data-bbox="936 1175 1898 1406">These recommendations result in a PAM instrumentation generic technical specification that includes a two COL items. As discussed in DC/COL-ISG-8, a COL applicant may complete the plant-specific technical specification list of required PAM instrumentation functions either by using the bounding approach, Option 2, or by using the programmatic approach, Option 3, with a plant-specific technical specification administrative program requiring that the list of technical specification required PAM</p>

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			<p>instrumentation functions be determined in accordance with an NRC approved methodology.</p> <p>In the alternative, instead of each COL applicant having to choose an option to complete the PAM COL item, the technical specification administrative program approach (DC/COL-ISG-8, Option 3) could be implemented in the generic technical specifications. This approach would better promote standardization of PAM requirements in plant-specific technical specifications because the administrative program technical specification would be developed on a generic basis for the design center, instead of for each COL applicant. Also, since PAM requirements would no longer be a COL item, the guidance in DC/COL-ISG-8 would not apply, and COL applicants could incorporate by reference the generic administrative program technical specification for PAM instrumentation into the plant-specific technical specifications. Therefore, GEH is requested to consider the alternative of revising PAM instrumentation requirements in the ESBWR generic technical specifications as follows.</p> <p>(1) Establish a new specification in Generic Technical Specification Section 5.5 similar to the following model:</p> <p>The following programs shall be established, implemented, and maintained.</p> <p>5.5.14 <u>Post-Accident Monitoring (PAM) Instrumentation Program</u></p> <p>This program provides controls to establish accident monitoring instrumentation functions that are required by Specification 3.3.3.2, "Post-Accident Monitoring (PAM) Instrumentation." These instrumentation functions shall be those designated as Type A, B, and C, as defined in Regulatory Guide (RG) 1.97, "Criteria for Accident Monitoring</p>

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			<p>Instrumentation for Nuclear Power Plants," Revision 4, June 2006, and shall be listed in the PAM function list document as described in FSAR Section 7.5.1. Changes to the list of Type A, B, and C functions shall be made in accordance with the provisions of 10 CFR 50.59 and RG 1.97, Revision 4.</p> <p>(2) Remove the brackets from Generic Technical Specification 3.3.3.2 and bases, and from Generic Technical Specification 5.6.5.</p> <p>(3) Revise Generic Technical Specification LCO 3.3.3.2 to state:</p> <p style="padding-left: 40px;">Two channels of each Type <u>A, B, and C</u> PAM Instrumentation Function associated with the DC and Uninterruptible AC Electrical Power Distribution Divisions required by LCO 3.8.6, "Distribution Systems - Operating," shall be OPERABLE.</p> <p>(4) Revise Generic Technical Specification 3.3.3.2 Conditions A and B to state:</p> <p style="padding-left: 40px;">A. One or more required Type-A PAM Functions with one required channel inoperable.</p> <p style="padding-left: 40px;">B. One or more required Type-A PAM Functions with two required channels inoperable.</p> <p>(5) Revise Availability Control 3.3.4 to address PAM instrumentation not required by revised Generic Technical Specification 3.3.3.2.</p> <p>(6) Remove COL Items 3.3.3.2-1 and 5.6.5-1 from DCD Table 16.0-1-A, including the reviewer's notes.</p>

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			<p>(7) Make suitable conforming changes to the bases for Generic Technical Specification 3.3.3.2, consistent with the bases for STS 3.3.3.1. The LCO section of the bases for Generic Technical Specification 3.3.3.2 need not discuss the specified Type A, B, and C PAM instrumentation functions. Revise the Background and the Applicable Safety Analysis sections of the bases to also include discussions of Type B and Type C PAM instrumentation functions.</p> <p>(8) Revise the Actions of Generic Technical Specification 3.3.3.2 to be consistent with the BWR/6 STS 3.3.3.1 Actions, which require placing the unit in Mode 3 within 12 hours if two required channels of certain PAM functions are inoperable for more than 7 days.</p>

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(Revised 09/09/2009)

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