

July 10, 2006

Mr. David H. Hinds, Manager, ESBWR
General Electric Company
P.O. Box 780, M/C L60
Wilmington, NC 28402-0780

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 41 RELATED TO
ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Hinds:

By letter dated August 24, 2005, General Electric Company (GE) 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 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. Questions 5.2-36 through 5.2-58 relate to the reactor coolant pressure boundary materials and preservice and inservice inspection and testing of the reactor coolant pressure boundary as discussed in Section 5.2.3 and 5.2.4 of the ESBWR design control document, Tier 2, Chapter 5. These questions were sent to you via electronic mail on June 2, 2006, and were discussed with your staff during a telecon on June 16, 2006. You provided clarification on two of the staff's questions, causing them to be withdrawn. You agreed to respond to this RAI by July 28, 2006.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-4115 or mcb@nrc.gov or you may contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Martha C. Barillas, Project Manager
ESBWR/ABWR Projects Branch
Division of New Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 52-010

Enclosure: As stated

cc: See next page

Mr. David H. Hinds, Manager, ESBWR
General Electric Company
P.O. Box 780, M/C L60
Wilmington, NC 28402-0780

July 10, 2006

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 41 RELATED TO
ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Hinds:

By letter dated August 24, 2005, General Electric Company (GE) 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 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. Questions 5.2-36 through 5.2-58 relate to the reactor coolant pressure boundary materials and preservice and inservice inspection and testing of the reactor coolant pressure boundary as discussed in Section 5.2.3 and 5.2.4 of the ESBWR design control document, Tier 2, Chapter 5. These questions were sent to you via electronic mail on June 2, 2006, and were discussed with your staff during a telecon on June 16, 2006. You provided clarification on two of the staff's questions, causing them to be withdrawn. You agreed to respond to this RAI by July 28, 2006.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-4115 or mcb@nrc.gov or you may contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Martha C. Barillas, Project Manager
ESBWR/ABWR Projects Branch
Division of New Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 52-010

Enclosure: As stated

cc: See next page
ACCESSION NO. ML061910189

OFFICE	NRBA/PM	NRBA/BC
NAME	MBarillas	ACubbage
DATE	07/10/2006	07/10/2006

OFFICIAL RECORD COPY

Distribution for DCD RAI Letter No. 41 dated July 10, 2006

Hard Copy

PUBLIC

NESB R/F

ACubbage

MBarillas

E-Mail

ACubbage

MGavrilas

JDanna

ACRS

OGC

LRossbach

LQuinones

MBarillas

JGaslevic

DHickman

RDavis

KGruss

JFair

JHuang

TSteinglass

YWong

JWu

REQUEST FOR ADDITIONAL INFORMATION (RAI)
ESBWR DCD, TIER 2 CHAPTER 5.2 - REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

RAI Number	Reviewer	Summary	Full Text
5.2-36	Davis R	Provide complete description of the RCPB and provide complete list of RCPB materials. (Other than the RPV).	SRP Section 5.2.3, Revision 2, July 1981. states that the specifications be reviewed for pressure-retaining ferritic materials, nonferrous metals and austenitic stainless steels, including weld materials, that are used for each component (e.g., vessels, piping, pumps, and valves) of the reactor coolant pressure boundary. DCD Tier 2, Table 5.2-1 is not complete because it does not list components in systems that are considered to be part of the reactor coolant pressure boundary (RCPB). There are inconsistencies in materials listed in DCD Tier 2 Tables 5.2-4 and 6.1-1 for the isolation condenser. Provide material type, specification and grade, for all pressure boundary materials, including weld material specifications and grades that make up the RCPB.
5.2-37	Davis R	Provide clarification regarding RCPB materials.	DCD Tier 2 Section 3E.2.2 states that SA 672 Gr. C70 is one of the carbon steels used in the ESBWR RCPB piping but this material is not listed in DCD Tier 2 Table 5.2-4 "Reactor Coolant Pressure Boundary Materials". Provide clarification.
5.2-38	Davis R	Discuss aging effects, thermal embrittlement, inspection needs, and ferrite content calculation of the cast Austenitic Stainless Steel.	Given that cast austenitic stainless steel (CASS) can be susceptible to thermal aging embrittlement, please discuss the following for any CASS component that acts as a RCPB: (1) the impact of this aging effect on the integrity of the components, (2) the consideration of the thermal embrittlement mechanism in the design and material selection for RCPB components, (3) the need for inspections to detect this aging effect, and (4) verify that δ -ferrite content is calculated using Hull's equivalent factors or a method producing an equivalent level of accuracy.

5.2-39	Davis R	Provide Specification for Nuclear Grade Stainless Steel.	DCD Tier 2, Section 5.2.3.2.2 indicates that Nuclear Grade Stainless steel is used in the ESBWR design. Please provide a specification for Nuclear Grade stainless steel used in the ESBWR design for RCPB components and identify the components.
5.2-40	Davis R	Provide discussion on DMWs.	Given the issues of susceptibility to stress corrosion cracking and welding fabrication flaws, associated with the performance of dissimilar metal welds (DMWs), provide a description of all DMWs in the RCPB and discuss the selection of filler metals and welding processes and process controls for DMWs in the ESBWR design. Also explain the inconsistencies between DCD Tier 2, Section 5.2.3.2.2 which indicates Alloy 82 will be used in the ESBWR design and DCD Tier 2, Section 3E.3.4 which indicates Alloy 182 will be used for bimetallic welds in the RCPB. If Alloy 182 is used, provide a basis given that it has been known to be susceptible to stress corrosion cracking.
5.2-41	Davis R	Provide information on XM-13 material.	DCD Tier 2, Section 5.2.3.2.3 indicates that XM-13 is used in the RCPB. Provide a description of the components fabricated from XM-13, the basis for selection of XM-13, and any proposed thermal treatment. Include any history of its use in light water reactors (LWRs).
5.2-42	Davis R	Provide correct materials specification.	In DCD Tier 2, Table 5.2-4 under Main Steam Piping, the specification for the contour nozzle indicates the class of material but not the Grade. Provide the appropriate Type/Grade of material.
5.2-43	Davis R	Provide description of corrosion allowances.	Provide a description of corrosion allowances for all unclad low alloy and carbon steel surfaces in the RCPB.

5.2-44	Davis R	Provide clarification on use of RG1.50.	DCD Tier 2, Section 5.2.3.3.2 indicates that the guidelines of Regulatory Guide (RG) 1.50 may not be followed. Please provide a description of the portions of RG 1.50 that will not be followed and a description of the steps that will be taken to ensure delayed cracking of the weld metal or heat affected zone will not occur. Explain in detail, the process methods, temperature monitoring and post weld bake out to be performed.
5.2-45	Davis R	Provide clarification regarding the extent of conformance to the guidance provided in RG 1.71.	DCD Tier 2, Section 5.2.3.4.2 indicates that the ESBWR design meets the intent of RG 1.71. In order to assess the applicants alternative, please discuss the specific portions of RG 1.71 that the ESBWR design does not conform to and provide an explanation as to how the ESBWR alternative meets the intent of RG 1.71.
5.2-46	Davis R	Provide clarification on use of NB-2550 through NB-2570.	DCD Tier 2, Section 5.2.3.3.3 indicates that wrought tubular products of the RCPB are subject to the requirements of NB-2550. Verify that the ESBWR design complies with the requirements of NB-2560 or NB-2570.
5.2-47	Davis R	Provide information on heat input and interpass temperature controls	Provide a description of the heat input and interpass temperature controls used during welding of stainless steel components.
5.2-48	Davis R	Provide description of special sensitization test.	Provide a description of the “special sensitization test” that will be applied to ensure the proper solution heat treatment of stainless steel components.
5.2-49	Davis R	Provide description of solution heat treatment requirements.	Provide a description of the solution heat treatment requirements for austenitic stainless steel components and welds.
5.2-50	Davis R	Provide basis for using Code Cases.	Provide a discussion on Code Cases listed in DCD Tier 2, Table 5.2-1 that have not been approved for use by the NRC including a basis for their use (i.e N-634, -491-2).

5.2-51	Davis R	Provide clarification on access for examinations.	Section 5.2.4.2 states that all items within the Class 1 boundary are designed to provide access for examinations required by ASME Section XI. However, the following sentence indicates that accessibility for preservice (PSI) and inservice inspection (ISI) is the responsibility of the COL holder. Please address this potential conflict and provide verification that the design provides accessibility for complete inspection in accordance with ASME Code, Section XI, Subarticle IWA-1500, and the requirements of 10 CFR 50.55a(g)(3)(I). Verify that these requirements are incorporated in the design process for Class 1 components.
5.2-52	Davis R	Provide Basis for minimum Spool Piece length.	The ESBWR Design uses a minimum spool piece length of $L=2T+152$ mm. Explain why this distance is sufficient to perform qualified ultrasonic examinations of the thickness range of component in the ESBWR design.
5.2-53	Davis R	Provide information regarding accessibility welds.	Clarify whether all austenitic to austenitic welds, that require an ultrasonic examination, are accessible from both the near and far side of the weld side. If not, discuss how a qualified UT examination will be performed.
5.2-54	Davis R	Provide description of Dissimilar Metal Welds that requires PSI and ISI inspections.	Describe all dissimilar metal welds within the Class 1 system that require volumetric examination as part of the PSI and/or ISI program. Confirm that all configurations will allow for access from both the near and far sides of the weld.
5.2-55	Davis R	Provide clarification regarding nozzle-to-vessel welds.	Section 5.2.4.2 states that nozzle-to-vessel welds often may have inherent access restrictions when vessel internals are installed. Please explain the cause of these inherent access restrictions. Please verify that these welds and nozzles are designed to be inspected in accordance with the ASME Code, Section XI, without the need for the COL holder to request relief from the regulations.

5.2-56	Davis R	Verify that information provided in 5.2.4 is consistent with the ASME Code Section XI, 2001 Edition with the 2003 Addenda.	Section 5.2.4.3.1 references category B-E and Section 5.2.4.5 references IWB-4000. Neither Category B-E nor Article IWB-4000 are included in the ASME Code Section XI, 2001 Edition with the 2003 Addenda. Provide references consistent with ASME Code Section XI, 2001 Edition with the 2003 Addenda.
5.2-57	Davis R	Provide information regarding PSI & ISI of cast components.	Clarify whether there are any cast components within the Class 1 system that will require a PSI and or ISI volumetric inspection. If so, clarify these components will have a specification that requires a casting process that strictly controls grain size to make ultrasonic examination less difficult and more reliable than castings with a large grain structure (i.e. that will be inspectible per a qualified Appendix VIII procedure).
5.2-58	Davis R	Verify that limitations and modifications listed in 10CFR50.55a have been considered.	The DCD indicates that the design to perform pre-service inspection is based on the requirements of the ASME Code, Section XI, 2001 Edition with the 2003 Addenda. Clarify whether the ESBWR Design is such that the COL applicant will be able to meet ALL of the ASME Section XI requirements including any limitations and modifications currently listed in 10CFR50.55a.

ESBWR

cc:

Mr. David H. Hinds, Manager
ESBWR
P.O. Box 780, M/C L60
Wilmington, NC 28402-0780

Mr. George B. Stramback
Manager, Regulatory Services
GE Nuclear Energy
1989 Little Orchard Street, M/C 747
San Jose, CA 95125

Mr. David Lochbaum, Nuclear Safety
Engineer
Union of Concerned Scientists
1707 H Street, NW., Suite 600
Washington, DC 20006-3919

Mr. Paul Gunter
Nuclear Information & Resource Service
1424 16th Street, NW, Suite 404
Washington, DC 20036

Mr. James Riccio
Greenpeace
702 H Street, Suite 300
Washington, DC 20001

Mr. Adrian Heymer
Nuclear Energy Institute
Suite 400
1776 I Street, NW
Washington, DC 20006-3708

Mr. Paul Leventhal
Nuclear Control Institute
1000 Connecticut Avenue, NW
Suite 410
Washington, DC 20036

Mr. Ron Simard
6170 Masters Club Drive
Suwanee, GA 30024

Mr. Brendan Hoffman
Research Associate on Nuclear Energy
and Environmental Program
215 Pennsylvania Avenue, SE
Washington, DC 20003

Mr. Jay M. Gutierrez
Morgan, Lewis & Bockius, LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004

Mr. Glenn H. Archinoff
AECL Technologies
481 North Frederick Avenue
Suite 405
Gaithersburg, MD. 20877

Mr. Gary Wright, Director
Division of Nuclear Facility Safety
Illinois Emergency Management Agency
1035 Outer Park Drive
Springfield, IL 62704

Mr. Charles Brinkman
Westinghouse Electric Co.
Washington Operations
12300 Twinbrook Pkwy., Suite 330
Rockville, MD 20852

Mr. Ronald P. Vijuk
Manager of Passive Plant Engineering
AP1000 Project
Westinghouse Electric Company
P. O. Box 355
Pittsburgh, PA 15230-0355

Mr. Ed Wallace, General Manager
Projects
PBMR Pty LTD
PO Box 9396
Centurion 0046
Republic of South Africa

Mr. Russell Bell
Nuclear Energy Institute
Suite 400
1776 I Street, NW
Washington, DC 20006-3708

Mr. Jerald S. Holm
Framatome ANP, Inc.
3315 Old Forest Road
P.O. Box 10935
Lynchburg, VA 24506-0935

Mr. Robert E. Sweeney
IBEX ESI
4641 Montgomery Avenue
Suite 350
Bethesda, MD 20814

Mr. Eugene S. Grecheck
Vice President, Nuclear Support Services
Dominion Energy, Inc.
5000 Dominion Blvd.
Glen Allen, VA 23060

Mr. George A. Zinke
Manager, Project Management
Nuclear Business Development
Entergy Nuclear, M-ECH-683
1340 Echelon Parkway
Jackson, MS 39213

E-Mail:

tom.miller@hq.doe.gov or
tom.miller@nuclear.energy.gov
sfrantz@morganlewis.com
ksutton@morganlewis.com
jgutierrez@morganlewis.com
mwetterhahn@winston.com
whorin@winston.com
gcesare@enercon.com
jerald.holm@framatome-anp.com
eddie.grant@exeloncorp.com
joseph_hegner@dom.com
steven.hucik@ge.com
david.hinds@ge.com
chris.maslak@ge.com
james1beard@ge.com
louis.quintana@gene.ge.com
wayne.massie@ge.com
kathy.sedney@ge.com
mgiles@entergy.com
george.stramback@gene.ge.com