

August 16, 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. 50 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. This RAI concerns the initial test program as described in Section 14.2 of the ESBWR design control document. An initial set of these questions was sent to you via electronic mail on May 24, 2006, and was discussed with your staff during a telecon on July 24, 2006. Based on that telecon two questions were removed and one was revised. The enclosed questions were sent to you via electronic mail on July 31, 2006, and question 14.2-14 was discussed with your staff during a telecon on August 3, 2006. You agreed to respond to this RAI on September 15, 2006.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-2863 or lwr@nrc.gov or you may contact Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Lawrence Rossbach, 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

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cc: See next page
ACCESSION NO. ML062270421

OFFICE	NESB/PM	NESB/BC(A)
NAME	LRossbach	JColaccino
DATE	08/15/2006	08/16/2006

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Distribution for DCD RAI Letter No. 50 dated August 16, 2006

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Requests for Additional Information (RAIs)
ESBWR Design Control Document (DCD) Section 14.2, Initial Test Program

RAI Number	Reviewer	Question Summary	Full Text
14.2-5	Concepcion M Kavanagh K	Verify redundancy, electrical independence, and testing of the fault tolerant digital controllers will be performed for the FWCS as part of pre-operational testing.	<p>Section 1.j of Regulatory Guide (RG) 1.68 states that the initial test program should include in its pre-operational phase the testing of instrumentation and control systems that (1) control normal operation of the facility, (2) provide information and alarms in the control room to monitor the operation and status of the facility, (3) establish that the facility is operating within design and license limits, (4) permit or support the operation of engineered safety features, and (5) monitor and record important parameters during and following postulated accidents. Also, section 1.j of RG 1.68 includes provisions to verify redundancy and electrical independence of these instrumentation and control systems.</p> <p>Consistent with the above RG: (a) Specify whether the fault tolerant digital controllers will be tested as part of the feedwater control system (FWCS) pre-operational test; and (b) Specify whether the redundancy and electrical independence of the FWCS will be verified as part of the system pre-operational test.</p> <p>If these tests will be performed, provide the appropriate test descriptions in the DCD Tier 2, Section 14.2.8.1.2. Otherwise, provide adequate justification for not performing the tests.</p>

Enclosure

14.2-6	Concepcion M Kavanagh K	Verify testing of heaters and testing for redundancy and electrical independence will be performed for the SLC system as part of the pre-operational testing.	<p>Section 1.b.(3) of RG 1.68 states that the initial test program should include testing of the standby liquid control (SLC) system in its pre-operational phase, including testing to verify redundancy and electrical independence. Also, verification of the operability of heaters used to control the solution temperature is required. The pre-operational test description of the SLC system does not include verification of electrical independence and redundancy for the Class 1E electrical system. Also, testing of the heater installed in the mixing drum is not addressed in the test description.</p> <p>Consistent with the above RG: (a) Specify whether the redundancy and electrical independence of the SLC system will be verified; and (b) Specify whether the heater installed in the mixing drum will be tested to verify its proper operation.</p> <p>If these tests will be performed, please provide the appropriate test descriptions in the DCD Tier 2, Section 14.2.8.1.3. Otherwise, provide adequate justification for not performing the tests.</p>
14.2-7	Concepcion M Kavanagh K	Specify whether the correct failure mode on loss of power will be verified as part of the CRD system pre-operational test.	<p>Section 1.b.(1) of RG 1.68 states that the initial test program should include the testing of the control rod drive (CRD) system in its pre-operational phase, including testing to verify the correct failure mode on loss of power. Consistent with the above RG, specify whether the correct failure mode on loss of power will be verified as part of the CRD system pre-operational test.</p> <p>If this test will be performed, please provide the appropriate test description in the DCD Tier 2, Section 14.2.8.1.4. Otherwise, provide adequate justification for not performing the test.</p>

14.2-8	Concepcion M Kavanagh K	Verify calibration, testing, and operability of sensors, and channel response time of the RPS/ESF systems will be performed as part of pre-operational testing.	<p>Section 1.c of RG 1.68 states that the initial test program should include the testing of the reactor protection system and engineered safety feature actuation (RPS/ESF) systems in its pre-operational phase. The pre-operational test description should include the testing of the response time of each of the protection channels, including sensors. The pre-operational test description of the SSLC does not include testing for channel response time or sensor calibration/testing. Consistent with the above RG, specify whether the channel response time and sensor calibration and testing will be performed during the SSLC pre-operational test.</p> <p>If these tests will be performed, provide the appropriate test descriptions in the DCD Tier 2, Section 14.2.8.1.6. Otherwise, provide adequate justification for not performing the test.</p>
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14.2-9	Concepcion M Kavanagh K	Verify testing of manual controls for MSIV's, RWCU/SDC, and containment isolation switches will be performed as part of pre-operational testing.	<p>Section 1.j of RG 1.68 states, in part, that the initial test program should include the testing of instrumentation and control systems that permit or support the operation of engineered safety features in its pre-operational phase. The pre-operational test description of the LD&IS does not include testing criteria for the following manual control functions:</p> <ol style="list-style-type: none"> 1. Actuation of each main steam isolation valve (MSIV) test switch 2. MSIV isolation switches 3. MSIV logic reset 4. Reactor water cleanup (RWCU)/ shutdown cooling (SCD) isolation switch 5. Containment isolation manual switch 6. Containment isolation logic reset 7. Reactor Building HVAC isolation <p>Consistent with the above RG, specify whether the above manual controls will be tested during the LD&IS pre-operational test.</p> <p>If these tests will be performed, provide the appropriate test descriptions in the DCD Tier 2, Section 14.2.8.1.8. Otherwise, provide adequate justification for not performing the tests.</p>
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14.2-10	Concepcion M Kavanagh K	Verify testing of manual controls for systems and equipment included in the RSS will be performed as part of pre-operational testing.	<p>Section 1.j of RG 1.68 states, in part, that the initial test program should include in its pre-operational phase the test of instrumentation and control systems that permit or support the operation of engineered safety features. The test program should include testing of instrumentation and controls used for shutdown from outside the control room. The pre-operational test description of the remote shutdown system (RSS) does not include testing to demonstrate proper operation of individual systems and equipment when operated from the remote shutdown panel. Consistent with the above RG, specify whether the individual systems and equipment included in the remote shutdown panel will be tested during the pre-operational test phase.</p> <p>If this test will be performed, provide the appropriate test description in the DCD Tier 2, Section 14.2.8.1.12. Otherwise, provide adequate justification for not performing the test.</p>
14.2-11	Concepcion M Kavanagh K	Verify testing for redundancy and electrical independence; testing for all modes of operation.	<p>Section 1.m of RG 1.68 states that the initial test program should include the test of the equipment and components used to handle or cool irradiated and non-irradiated fuel in its pre-operational phase . The test description should include verification of redundancy and electrical independence. The pre-operational test description of the fuel and auxiliary pools cooling system (FAPCS) does not include provisions for verifying electrical independence and redundancy. Also, the FAPCS has 8 modes of operation in which different flow paths are necessary to achieve cooling and cleaning capability.</p> <p>Consistent with the above RG:</p> <ul style="list-style-type: none"> (a) Specify whether the redundancy and electrical independence of the FAPCS will be verified as part of the FAPCS pre-operational test; and (b) Specify whether all the FAPCS modes of operation will be tested during the pre-operational phase. <p>If these tests will be performed, provide the appropriate test descriptions in the DCD Tier 2, Section 14.2.8.1.14. Otherwise, provide adequate justification for not performing the tests.</p>

14.2-12	Concepcion M Kavanagh K	Verify testing for redundancy and electrical independence of the ARM will be performed as part of pre-operational testing.	<p>Section 1.k.(1) of RG 1.68 states that the initial test program should include the test of the equipment and components used to monitor or measure radiation levels in its pre-operational phase. The test description should include testing to verify redundancy and electrical independence. The pre-operational test description of the area radiation monitor (ARM) system does not include provisions for verifying electrical independence and redundancy. Consistent with the above RG, specify whether the redundancy and electrical independence of the ARM system will be verified as part of the ARM system pre-operational test.</p> <p>If this test will be performed, provide the appropriate test description in the DCD Tier 2, Section 14.2.8.1.14 . Otherwise, provide adequate justification for not performing the test.</p>
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14.2-13	Concepcion M Kavanagh K	Verify testing for redundancy and electrical independence of IA and SA systems. Demonstrate that IA and SA cannot be inadvertently interconnected as part of pre-operational testing.	<p>Section 1.n.(11) of RG 1.68 states that the initial test program should include the test of the compressed gas systems used to support the normal operation of the facility or are essential for the operation of standby safety equipment or engineered safety features in its pre-operational phase. The test program should include verification of redundancy and electrical independence of the compressed gas system. RG 1.68.3, "Preoperational Testing of Instrument and Control Air Systems," provides guidance for conducting pre-operational testing of the instrument and control air systems. Regulatory position 9 of RG 1.68.3 calls for tests to demonstrate that air supplies such as the service air (SA) supply is not inadvertently tied into the instrument air (IA) system.</p> <p>Consistent with the above RG:</p> <ul style="list-style-type: none"> (a) Specify whether the redundancy and electrical independence of the IA and SA Systems will be verified as part of the system pre-operational test; and (b) Specify whether a demonstration that the IA system and the SA system cannot be inadvertently interconnected will be conducted as part of the Instrument Air and Service Air Systems preoperational test. <p>If these tests will be performed, provide the appropriate test descriptions in the DCD Tier 2, Section 14.2.8.1.19 . Otherwise, provide adequate justification for not performing the tests.</p>
14.2-14	Concepcion M Kavanagh K	Identify changes to DCD section 14.2 resulting from recent design change to AC distribution system.	Identify changes to DCD Section 14.2 resulting from recent design change to AC distribution system.

14.2-15	Concepcion M Kavanagh K	Justify the exemption from testing for the systems in Section 14.2.9.	The staff requests additional information concerning the structures, systems, and components (SSCs), and design features which are candidates for proposed exemptions from operating license conditions requiring NRC prior approval for major test changes. These SSCs and design features are listed in Section 14.2.9 of the ESBWR DCD Tier 2, "COL Information." Provide the basis for exemption of each of the systems listed in Section 14.2.9.
14.2-16	Concepcion M Kavanagh K	Proposed COL action item regarding organizational and staffing responsibilities.	Please include a COL action item to provide complete, detailed information regarding the staff responsibilities, authorities, and personnel qualifications for conducting the initial test program in accordance with RG 1.68, to ensure the plant owner/operator provides the necessary information to be reviewed by the NRC staff at the time of the COL application.
14.2-17	Concepcion M Kavanagh K	Proposed COL action item regarding the development, review, and approval of test procedures.	Please include a COL action item to provide complete, detailed information regarding the development, review, and approval of test procedures in accordance with RG 1.68, to ensure the plant owner/operator provides the necessary information to be reviewed by the NRC staff at the time of the COL application.
14.2-18	Concepcion M Kavanagh K	Proposed COL action item regarding the utilization of reactor operating and testing experience.	Please include a COL action item to provide complete, detailed information regarding the utilization of reactor operating and testing experience in accordance with RG 1.68, to ensure the plant owner/operator provides the necessary information to be reviewed by the NRC staff at the time of the COL application.
14.2-19	Concepcion M Kavanagh K	Proposed COL action item regarding the trial use of operating and emergency procedures.	Please include a COL action item to provide complete, detailed information regarding the trial use of operating and emergency procedures in accordance with RG 1.68, to ensure the plant owner/operator provides the necessary information to be reviewed by the NRC staff at the time of the COL application.

14.2-20	Concepcion M Kavanagh K	Proposed COL action item regarding the development of the test program schedule and sequence.	Please include a COL action item to provide complete, detailed information regarding the development of the test program schedule and sequence in accordance with RG 1.68, to ensure the plant owner/operator provides the necessary information to be reviewed by the NRC staff at the time of the COL application.
14.2-21	Concepcion M Kavanagh K	Proposed COL action item regarding the initial startup testing phase.	The specifics of the startup tests relating to test methodology, plant prerequisites, initial conditions, acceptance criteria, and analysis techniques are responsibility of the plant owner/operator. Please include a COL action item to provide complete, detailed information regarding the initial startup testing phase in accordance with RG 1.68, to ensure the plant owner/operator provides the necessary information to be reviewed by the NRC staff at the time of the COL application.

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
Suwanne, 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

Ms. Sandra Sloan
Areva NP, 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
erg-xl@cox.net
joseph_hegner@dom.com
mark.beaumont@wsms.com
steven.hucik@ge.com
patriciaL.campbell@ge.com
bob.brown@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
tansel.selekler@nuclear.energy.gov or
tansel.selekler@hq.doe.gov
george.stramback@gene.ge.com