



HITACHI

GE Hitachi Nuclear Energy

James C. Kinsey
Vice President, ESBWR Licensing

PO Box 780 M/C A-55
Wilmington, NC 28402-0780
USA

T 910 675 5057
F 910 362 5057
jim.kinsey@ge.com

MFN 06-137, Supplement 3

Docket No. 52-010

May 8, 2008

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to NRC Request for Additional Information Related
to ESBWR Design Certification Application - RAI Number 7.5-3
Supplement 2**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to the U.S. Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) sent via email from Lauren Quinones dated April 24, 2007 (see Reference 1). The supplemental RAI response is included in Enclosure 1. The original NRC RAI 7.5-3 was sent via the Reference 2 letter and the response was submitted via the Reference 3 letter. The original NRC RAI 7.5-3 Supplement 1 was sent via the Reference 4 letter and the response was submitted via the Reference 5 letter.

If you have any questions or require additional information, please contact me.

Sincerely,

Lee F. Dougherty for
James C. Kinsey
Vice President, ESBWR Licensing

*DOGB
NRC*

References:

1. Email from Lauren Quinones (U.S. Nuclear Regulatory Commission) to GE, sent April 24, 2007, RAI 7.5-3 Supplement 2
2. MFN 06-114, Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, GE, *Request for Additional Information Letter No. 19 Related to ESBWR Design Certification*, dated April 24, 2006
3. MFN 06-137, Letter from David H. Hinds, GE to U.S. Nuclear Regulatory Commission, *Response to RAI Letter No. 19 Related to ESBWR Design Certification Application – Instrumentation and Controls – RAI Numbers 7.5-3 and 7.5-4*, dated May 17, 2006
4. MFN 06-388, Letter from U.S. Nuclear Regulatory Commission to David H. Hinds, GE, *Request for Additional Information Letter No. 76 Related to ESBWR Design Certification*, dated October 11, 2006
5. MFN 06-137 Supplement 1, Letter from James C. Kinsey, GE to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information - Letter No. 76 Related to ESBWR Design Certification Application – DCD Section 7.5 – Instrumentation and Controls - RAI Number 7.5-3 Supplement 1*, dated April 10, 2007

Enclosures:

1. Response to NRC Request for Additional Information Related to ESBWR Design Certification Application - RAI Number 7.5-3 Supplement 2
2. Preliminary List of Post Accident Monitoring Variables

cc:

AE Cubbage	USNRC (with enclosure)
GB Stramback	GEH/San Jose (with enclosure)
RE Brown	GEH/Wilmington (with enclosure)
DH Hinds	GEH/Wilmington (with enclosures)
eDRF Section	0000- 0075-3170 (RAI 7.5-3 Supplement 2)

Enclosure 1

MFN 06-137, Supplement 3

**Response to NRC Request for Additional
Information Related to ESBWR Design**

Certification Application –

RAI Number 7.5-3, Supplement 2

For historical purposes, the original text of NRC RAI 7.5-3 and RAI 7.5-3 Supplement 1 with the GE responses are included.

NRC RAI 7.5-3

Nuclear Regulatory Commission (NRC) has issued a draft regulatory guide DG-1128, "Criteria for Accident monitoring Instrumentation for Nuclear Power Plants," in August, 2005. This document is expected to be issued as Revision 4 of Regulatory guide 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear power Plants," in Mid- 2006. This regulatory guide endorses, with certain modifications explained in the regulatory position, IEEE Std. 487-2002, "IEEE Standard Criteria for Accident Monitoring Instrumentation for Nuclear Power Generating Stations," as an acceptable method for providing instrumentation to monitor variables for accident conditions. This revised regulatory guide is intended for applicant/licensees of new nuclear power plants. The staff has reviewed the ESBWR DCD, Tier 2, Section 7.5.1, "General I&C Conformance to Regulatory Guide 1.97," and Table 7.5-1. "Design and Qualification for Instrumentation." The staff finds that many criteria in the IEEE Std. 497-2002 recommendation have not been addressed in the ESBWR DCD. Please commit to update DCD Tier 2, Section 7.5.1 and Table 7.5-1 to address all the IEEE Std. 497-2002 criteria and the relevant requirements stated in RG 1.97, Revision 4, when published.

GE Response

GE will update the DCD Tier 2, Section 7.5.1 and Table 7.5-1, to address the IEEE Std. 497-2002 criteria and the relevant requirements stated in Reg. Guide 1.97, Rev. 4, when published.

NRC RAI 7.5-3 Supplement 1

In response to NRC RAI 7.5-3, the applicant stated that GE will update the DCD, Tier 2, Section 7.5.1 and Table 7.5-1, to address the IEEE Std. 497-2002 criteria and the relevant requirements stated in RG 1.97, Revision 4, when published. Regulatory Guide 1.97, Revision 4 was published in June, 2006. Please update the DCD section 7.5 to address ESBWR's design approach for post-accident monitoring systems.

GE Response

DCD Tier 2 Revision 2 subsection 7.5.1 was updated to address ESBWR's design approach for post-accident monitoring instrumentation. Additional information was added to subsection 7.5.1 in Revision 3. Subsection 7.5.1

addresses the IEEE Std. 497- 2002 criteria and the relevant requirements stated in RG 1.97, Revision 4.

DCD/LTR Impact

No additional changes to the DCD are required by this RAI.

NRC RAI 7.5-3 Supplement 2

Request received via email from Lauren Quinones 4/24/2007:

In response to NRC RAI 7.5-3, supplement 1, the applicant stated that DCD Subsection 7.5.1 addresses the IEEE Std 497-2002 criteria and the relevant requirements stated in RG 1.97, Rev. 4. The functional requirement analysis (FRA), allocation of functions (AOF), and task analysis (TA) will provide an independent list of the required RG 1.97 parameters via their respective results summary reports (RSP). The applicant has not committed when these reports will be available for staff review and approval. The staff believes that a generic post accident monitoring instrumentation parameter list according to RG 1.97 Rev. 4 criteria should be provided as part of the certified design package. The COL application reference the ESBWR certified design may justify its deviation from the generic post accident monitoring instrumentation parameter list due to plant-specific condition.

GEH Response

DCD Tier 1, Rev. 4, Table 3.3-1, ITAAC For Human Factors Engineering, ITAAC 6 requires a summary report containing a list of instruments comprising the minimum inventory of human-system interface (HSI) and that complies with RG 1.97 and supporting analysis.

DCD Tier 1, Rev. 4, Table 3.7-1, ITAAC For The Post Accident Monitoring Instrumentation, provides the ITAAC for Post Accident Monitoring Instrumentation.

The GEH response to RAI 18.5-27 S02 (submitted via MFN 07-624, dated January 17, 2008) provides additional information as to how the minimum inventory HSIs will be developed.

The Distributed Control and Information System (DCIS) consists of a safety-related portion, Q-DCIS, and a nonsafety-related portion, N-DCIS. The Diverse Protection System (DPS) is part of the N-DCIS. Safety-related VDUs display information from Q-DCIS. Data from Q-DCIS and N-DCIS (including DPS) are both available for display on the nonsafety-related VDUs. See the GEH response to RAI 7.1-65 for additional information (submitted via MFN 08-319, dated April 11, 2008).

Both safety-related and nonsafety-related VDUs are available in the Main Control Room and at the Remote Shutdown Panels. Data can be organized for displays and reports in the required combinations. The function of the HFE group is to define task and functional requirements (including system operation and

regulatory required monitoring) and then to design and organize display formats that accomplish those requirements.

A preliminary list of post accident monitoring parameters, based on review of DCD Tier 2, Revision 4, Chapter 15, Safety Analysis is provided in Enclosure 2. This list will not be included in the DCD Revision 5 since the HSI analysis is not yet complete.

The functional requirement analysis (FRA), allocation of functions (AOF), and task analysis (TA) performed to support closure of the referenced ITAACs will provide the list of the required RG 1.97 parameters via their respective results summary reports.

DCD Impact

No DCD changes will be made in response to this RAI.

Enclosure 2

MFN 06-137, Supplement 3

Preliminary List of Post Accident Monitoring Variables

Preliminary List of Post Accident Monitoring Variables
[Response to RAI 7.5-3 S02]

Type	System	Variable
A		None identified at the current state of design.
B	NBS	RPV Water Level – Shutdown Range
B	NBS	RPV Water Level – Narrow Range
B	NBS	RPV Water Level – Wide Range
B	NBS	RPV Water Level – Fuel Zone Range
B	NBS	RPV Dome Pressure, Narrow & Wide Ranges
B	NMS	Neutron Flux
B	NBS	MSIV Position
B	SLC	Boron Concentration (Grab Sample)
B	Various	Containment Isolation Valve Positions
B, C	CMS	Wetwell Pressure
B, C	EFDS	Drywell Sump Level
B, C, D	CMS	Drywell Pressure
B, C, D	NBS	Reactor Pressure
C	CMS	Drywell/Wetwell Hydrogen Concentration
C	CMS	Drywell/Wetwell Oxygen Concentration
C, E	CMS	Containment Area Radiation Level
C, D	CMS	Suppression Pool Water Level
C, D	ICS	Isolation Condenser Steam Line Flowrate
C, D	ICS	Isolation Condenser Condensate Line Flowrate
C, D, E	PRMS	Isolation Condenser Pool Radiation Level
D	CMS	Suppression Pool Water Temperature
D	CMS	Drywell Temperature
D	CMS	Lower Drywell Water Level
D	CMS	Upper Drywell Water Level
D	FAPCS	Isolation Condenser/Passive Containment Cooling System Pool Water Level
D	GDCS	Gravity Driven Cooling System Pool Water Level
D	GDCS	Gravity Driven Cooling System Valve Positions

Preliminary List of Post Accident Monitoring Variables
[Response to RAI 7.5-3 S02]

Type	System	Variable
D	GDCS	Suppression Pool Equalizing Valve Positions
D	ICS	Isolation Condenser Valve Positions
D	RWCU/SDC	RWCU/Shutdown Cooling System Flowrate
D	SLC	Standby Liquid Control System Pressure
D	SLC	SLC System Accumulator Solution Level
D	Electrical Power	Offsite Power and Onsite Power Status
D	FWCS	Feedwater Flowrate
D	RC&IS	Control Rod Position
D	RWCU/SDC	RWCU/SDC System Non-Regenerative Heat Exchanger Outlet Temperature
E	PRMS	High Conductivity Waste Drywell Sump Discharge Radiation Level
E	PRMS	Low Conductivity Waste Drywell Sump Discharge Radiation Level
E	PRMS	Refuel Handling Area HVAC Exhaust Radiation Level
E	PRMS	FB Fuel Pool HVAC Radiation Level
E	PRMS	Reactor Building HVAC Exhaust Radiation Level
E	PRMS	Control Building Air Intake HVAC Radiation Level
E	PRMS	Containment Purge Exhaust Radiation Level
E	ARMS	Area Radiation Level
E	Plant Specific	Meteorological Data (Wind Speed, Wind Direction, and Atmospheric Stability)
E	PRMS	On-Site Analysis (Primary Coolant, Sump and Containment Air Grab Sampling)
E	Plant Specific	Plant Environment Radiation/Radioactivity Levels