



HITACHI

Security Notice

This letter forwards Security-Related information in accordance with 10CFR2.390. Upon removal of Enclosure 1, the balance of this letter may be considered non-Security-Related.

MFN 08-141

Docket No. 52-010

February 26, 2008

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

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 132 Related to ESBWR Design Certification Application, RAI Number 19.1-162**

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 by NRC letter dated January 15, 2008 (Reference 1). The GEH response to RAI Number 19.1-162 is in Enclosures 1 through 3.

Enclosure 2 contains Security-Related information identified by the designation "**{{{Security-Related Information - Withhold Under 10 CFR 2.390}}}**." GEH hereby requests this information be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390. The public version is contained in Enclosure 3.

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

Sincerely,

James C. Kinsey
Vice President, ESBWR Licensing

GE Hitachi Nuclear Energy

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Reference:

1. MFN-08-040. Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request For Additional Information Letter No. 132 Related To ESBWR Design Certification Application*, January 15, 2008

Enclosures:

1. Response to Portion of NRC Request for Additional Information Letter No. 132 Related to ESBWR Design Certification Application, ESBWR Probabilistic Risk Assessment, RAI Number 19.1-162
2. DCD Tier 2 Appendix 9A, Revision 4 Markup, *Security-Related*
3. DCD Tier 2 Appendix 9A, Revision 4 Markup, NEDO-33201, Section 12.2.2, Revision 3 Markup, *Non-Security-Related*

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Enclosure 1

MFN 08-141

**Response to Portion of NRC Request for
Additional Information Letter No. 132
Related to ESBWR Design Certification Application
ESBWR Probabilistic Risk Assessment
RAI Number 19.1-162**

NRC RAI 19.1-162

Question Summary: ESBWR fire PRA model does not accurately reflect fire area F3140 described in DCD, Tier 2, Revision 4, Appendix 9A.

According to DCD, Tier 2, Revision 4, Appendix 9A, Rooms 3140 and 3301 are included in fire area F3140. However, the ESBWR PRA, Revision 2, Chapter 12 assumes these rooms are separate fire areas (i.e., Room 3301 only is a fire area and is separate from fire area F3140). This discrepancy is considered significant in that core damage frequency from internal fire could significantly increase if Rooms 3140 and 3301 are in the same fire area.

The staff requests that GEH clarify the boundary of fire area(s) that include Rooms 3140 and 3301. If Rooms 3140 and 3301 are separate fire areas, then the staff requests that GEH provide the basis for this separation (the cable chase connecting the two rooms could quickly propagate a fire vertically from one room to the other). If Rooms 3140 and 3301 belong to the same fire area (i.e., F3140), then the staff requests that GEH update the ESBWR fire PRA model to reflect this.

GEH Response

DCD Tier 2, Revision 5, Appendix 9A, will define two separate fire areas F3140 and F3301 for rooms 3140 and 3301, respectively. The basis for this separation is to enhance the ESBWR plants capability to mitigate fire risk. Fire barriers with a 3-hour rating will be provided with rated penetration seals at fire slabs encountered in the vertical cable chase that connects rooms 3140 and 3301.

With the changes in DCD Tier 2, Revision 5, Appendix 9A, the fire PRA model requires no update. Assumption #6 in NEDO-33201 Revision 3, Section 12.2.2, will be deleted since it is no longer an assumption.

DCD Impact

DCD Tier 2, Revision 5, Appendix 9A, will be revised as noted in the attached markup.

NEDO-33201, Revision 3, Section 12.2.2, will be revised as noted in the attached markup.

Enclosure 3

DCD Tier 2 Appendix 9A, Revision 4 Markup

NEDO-33201, Section 12.2.2, Revision 3 Markup

Non-Security-Related

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Figure 9A.2-3. Nuclear Island Fire Protection Zones ESBWR DCD EL-1000
{{{Security-Related Information - Withheld Under 10 CFR 2.390.}}}

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Figure 9A.2-4. Nuclear Island Fire Protection Zones ESBWR DCD EL4650
{{{Security-Related Information - Withheld Under 10 CFR 2.390.}}}

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Figure 9A.2-11. Nuclear Island Fire Protection Zones ESBWR DCD Section “B-B”
{{{Security-Related Information - Withheld Under 10 CFR 2.390.}}}

**Table 9A.5-3
Control Building (cont.)**

Fire Area: F3140			Description: Division IV Electrical							
Building: Control			Applicable codes: IBC; Reg Guide 1.189; NFPA 10, 14, 72, 75, 101, 804							
DCD Fig:			Building code occupancy classification:		F-1					
9A.2-2			Electrical classification:		none					
9A.2-3			Safety-related divisional equipment or cables:		IV					
9A.2-4			Nonsafety-related redundant trains or equipment or cables:		none					
9A.2-5			Surrounded by fire barriers rated at:		3 hours					
			Except:		basemat (non-rated)					
Consisting of the following Rooms:			Fire Detection		Fire Suppression					
EL	Room #	Potential Combustibles	Primary	Backup	Primary	Backup				
-7400	duct bank	Cable insulation	None	None	None	None				
-7400	3140		Area-wide ionization	Manual pulls (outside stairwell	CO2 fire extinguishers	Hose racks (in nearby stairwells)				
below floor										
-6800	3140	Cable insulation		at each landing)						
		Electrical equipment								
			<table><tr><td>< 1400</td><td>Anticipated combustible load, MJ/m2</td></tr><tr><td>1400</td><td>Unsprinklered combustible load limit, MJ/m2</td></tr></table>		< 1400	Anticipated combustible load, MJ/m2	1400	Unsprinklered combustible load limit, MJ/m2	Assuming automatic & manual FP equipment does not function, impact of design basis fire on safe shutdown: Complete burnout of all equipment and cables within this Fire Area results in loss of only Division IV safe shutdown equipment circuits; remaining three divisions of safe shutdown and redundant trains A and B equipment are unaffected by fire and are operable. Automatic logic control scheme (any two out of four redundant signals) remains operable.	
< 1400	Anticipated combustible load, MJ/m2									
1400	Unsprinklered combustible load limit, MJ/m2									
Assuming operation of installed fire extinguishing equipment, impact of fire upon:										
Plant operation:			None							
Radiological release:			None, no radiological materials present							
Life safety:			Travel distance limits to EXITs meet NFPA 101							
Manual firefighting:			Access via stairwells							
Property loss:			Significant							

**Table 9A.5-3
Control Building (cont.)**

Fire Area: F3140			Description: Division 4 Electrical							
Building: Control			Applicable codes: IBC; Reg Guide 1.189; NFPA 10, 14, 72, 75, 101, 804							
DCD Fig:			Building code occupancy classification: F-1							
9A.2-2			Electrical classification: none							
9A.2-11			Safety-related divisional equipment or cables: 4							
			Nonsafety-related redundant trains or equipment or cables: none							
			Surrounded by fire barriers rated at: 3 hours							
			Except: basemat (non-rated)							
Consisting of the following Rooms:			Fire Detection		Fire Suppression					
EL	Room #	Potential Combustibles	Primary	Backup	Primary	Backup				
-7400	duct bank	Cable insulation	None	None	None	None				
-7400	3140 below floor		Area-wide ionization	Manual pulls (outside stairwell at each landing)	CO2 fire extinguishers	Hose racks (in nearby stairwells)				
-6800	3140	Cable insulation Electrical equipment								
<table border="1"> <tr> <td>< 1400</td> <td>Anticipated combustible load, MJ/m2</td> </tr> <tr> <td>1400</td> <td>Unsprinklered combustible load limit, MJ/m2</td> </tr> </table>			< 1400	Anticipated combustible load, MJ/m2	1400	Unsprinklered combustible load limit, MJ/m2	Assuming automatic & manual FP equipment does not function, impact of design basis fire on safe shutdown: Complete burnout of all equipment and cables within this Fire Area results in loss of only Division 4 safe shutdown equipment circuits; remaining three divisions of safe shutdown and redundant trains A and B equipment are unaffected by fire and are operable. Automatic logic control scheme (any two out of four redundant signals) remains operable.			
< 1400	Anticipated combustible load, MJ/m2									
1400	Unsprinklered combustible load limit, MJ/m2									
Assuming operation of installed fire extinguishing equipment, impact of fire upon:										
Plant operation:			None							
Radiological release:			None, no radiological materials present							
Life safety:			Travel distance limits to EXITS meet NFPA 101							
Manual firefighting:			Access via stairwells							
Property loss:			Significant							

**Table 9A.5-3
Control Building (cont.)**

Fire Area: F3301			Description: Nonsafety-Related Electrical Train A						
Building: Control			Applicable codes: IBC; Reg Guide 1.189; NFPA 10, 14, 72, 75, 101, 804						
DCD Fig:			Building code occupancy classification: F-1						
9A.2-3			Electrical classification: none						
9A.2-4			Safety-related divisional equipment or cables: none						
9A.2-11			Nonsafety-related redundant trains or equipment or cables: A						
			Surrounded by fire barriers rated at: 3 hours						
			Except: None						
Consisting of the following Rooms:			Fire Detection		Fire Suppression				
EL	Room #	Potential Combustibles	Primary	Backup	Primary	Backup			
4650	3301 below access floor	Cable insulation	Area-wide ionization	Manual pulls (outside stairwell at each landing)	CO2 fire extinguishers	Hose racks (in nearby stairwells)			
5250	3301	Cable insulation							
		Electrical equipment							
<table border="1"> <tr> <td>< 1400</td> <td>Anticipated combustible load, MJ/m2</td> </tr> <tr> <td>1400</td> <td>Unsprinklered combustible load limit, MJ/m2</td> </tr> </table>			< 1400	Anticipated combustible load, MJ/m2	1400	Unsprinklered combustible load limit, MJ/m2	Assuming automatic & manual FP equipment does not function, impact of design basis fire on safe shutdown: Complete burnout of all equipment and cables within this Fire Area affects no safety-related or safe shutdown equipment; all safety divisions and train B are operable.		
< 1400	Anticipated combustible load, MJ/m2								
1400	Unsprinklered combustible load limit, MJ/m2								
Assuming operation of installed fire extinguishing equipment, impact of fire upon:									
Plant operation:			Turbine trip; outage required to restore						
Radiological release:			None, no radiological materials present						
Life safety:			Travel distance limits to EXITs meet NFPA 101						
Manual firefighting:			Access via stairwells						
Property loss:			Significant						

12.2.1 General Assumptions

The fire risk analysis is performed using conservative assumptions due, in part, to the stage of the design. The key conservative assumptions are summarized below:

- (1) The analysis recognizes that a fire ignition in any fire area may grow into a fully-developed fire.
- (2) The analysis does not take credit for any fire suppression (i.e., self-extinguishment, installed suppression systems, nor manual fire fighting activities). Therefore, the analysis assumes that all fires disable all potentially affected equipment in the area.
- (3) The analysis does not take credit for the distance between fire sources and targets.
- (4) The analysis assumes that all fire-induced equipment damage occurs at $t=0$.
- (5) Design requirements have been implemented to prevent spurious actuations induced by a fire in a single fire area in the reactor building that could adversely affect safe shutdown. Fire propagation cases in the Reactor Building are conservatively assumed to result in the inadvertent opening of relief valves (IORV) initiating event.

Other key assumptions are listed in the following paragraphs with respect to the specific tasks.

12.2.2 Task 1 Plant Partitioning Assumptions:

Since the insights from fire PRA analysis are impacting the detailed designs, the following assumptions are made in the fire PRA analysis as a result of that process:

- (6) ~~Fire area F3301 is assumed to include room 3301 only while fire area F3140 is assumed to include room 3140 only. Since the two rooms are only connected by a cable chase and are well separated, it is difficult for a fire to propagate from one room to the other. A sensitivity case on this assumption is performed in Section 11 for the full power fire sensitivity study.~~ Deleted.
- (7) In Table 12.3-1, two new fire areas are assumed: FFPE and FSWYD. The first one assumes the fire pumphouse enclosure for fire protection system. Fire area FSWYD is used to evaluate a postulated fire in the switchyard area that is conservatively assumed to result in a loss of preferred power (LOPP) without potential for recovery.

12.2.3 Task 2 Component Selection Assumptions:

The following assumptions are made in this task:

- (8) The main control room (MCR) controls will be connected to the DCIS rooms (unaffected by a main control room fire) via fiber cables and that the loss (including melting) of the fibers or visual display units (VDUs) will not cause inadvertent actuations nor affect the automatic actions associated with safety and non-safety equipment.