

GE-Hitachi Nuclear Energy Americas LLC

James C. Kinsey  
Project Manager, 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 07-024  
Supplement 2

Docket No. 52-010

August 24, 2007

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. 77 Related to ESBWR Design Certification Application -  
Technical Specifications - RAI Number 16.2-98 S01**

Enclosure 1 contains the subject supplemental RAI response resulting from a May 14, 2007 e-mail from the NRC. GE's original response was provided in the Reference 1 letter.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,



James C. Kinsey  
Project Manager, ESBWR Licensing

DO28

U20

References:

1. MFN 07-024, Letter from Jim Kinsey to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 77 Related to ESBWR Design Certification Application - Technical Specifications - RAI Numbers 16.2-33, 16.2-52, 16.2-75, 16.2-90 through 16.2-94, and 16.2- 97 through 16.2-109*, January 18, 2007

Enclosures:

1. MFN 07-024, Supplement 2 - Response to Portion of NRC Request for Additional Information Letter No. 77 Related to ESBWR Design Certification Application - Technical Specifications - RAI Number 16.2-98 S01

cc: AE Cubbage USNRC (with enclosures)  
DH Hinds GEH (with enclosures)  
RE Brown GEH (w/o enclosures)  
eDRF 0073-1431

**Enclosure 1**

**MFN 07-024, Supplement 2**

**Response to Portion of NRC Request for**

**Additional Information Letter No. 77**

**Related to ESBWR Design Certification Application**

**- Technical Specifications -**

**RAI Number 16.2-98 S01**

**NRC RAI 16.2-98**

*TS 3.5.2 Bases: Action A.1 states "If one GDCS injection branch line is inoperable, [at least [4] GDCS injection branch lines will be available to respond..." There are 8 injection branch lines so at least 7 injection branch lines will be available.*

- (A) Clarify why only 4 GDCS injection lines are specified.*
- (B) Clarify Action B.1, since there are 4 equalizing lines and if one equalizing line is inoperable the remaining 3 are operable.*
- (C) Clarify Action C.1 for two GDCS injection branch lines inoperable and Action D.1 for two GDCS equalizing lines inoperable.*

**GE Response**

Design Control Document (DCD) Tier 2, Revision 2, Chapter 16, LCO 3.5.2, "Gravity-Driven Cooling System (GDCS) – Operating," requires operability of the following: a) eight branch lines of the injection subsystem; and, b) four trains of the equalizing subsystem.

LCO 3.5.2, Condition A, Bases explain that a minimum of 4 GDCS injection branch lines will function as required when 1 of the 8 GDCS injection branch lines is inoperable at the start of a loss of coolant accident (LOCA). Only 4 GDCS injection branch lines may function because 1 of the 8 branch lines is inoperable, a second branch line is lost to a random single failure, and two additional branch lines are potentially lost if the break location is an injection branch line, which, as explained in DCD Tier 2, Revision 2, Section 6.3.1.1.2, could prevent injection flow through two injection branch lines.

LCO 3.5.2, Condition B, Bases explain that a minimum of 1 GDCS equalizing train will function as required when 1 of the 4 GDCS equalizing trains is inoperable at the start of a LOCA. Only 1 GDCS equalizing train may function because 1 of the 4 equalizing trains is inoperable, a second equalizing train is lost to a random single failure, and a third equalizing train is potentially lost if the break location is a GDCS equalizing train. This is consistent with DCD Tier 2, Revision 2, Section 6.3.2.7.1, which states that the LOCA analysis assumes a double ended-guillotine-break in one GDCS equalizing train and a worst single failure, which is the failure of a second equalizing train.

LCO 3.5.2, Condition C, applies when 2 of the 8 GDCS injection branch lines are inoperable. Based on the discussions above, the minimum required number of GDCS injection branch lines assumed in the LOCA analysis would function when in Conditions C; however, the ability to tolerate a random single failure is lost. Therefore, at least 1 of the 2 inoperable GDCS injection branch lines must be restored to operable within the specified limit.

LCO 3.5.2, Condition D, applies when 2 of the 4 GDCS equalizing trains are inoperable. Based on the discussions above, the minimum required number of GDCS equalizing trains assumed in the LOCA analysis would function when in Conditions D; however, the ability to tolerate a random single failure is lost. Therefore, at least 1 of the 2 inoperable GDCS equalizing trains must be restored to operable within the specified limit.

GE has revised the Bases for LCO 3.5.2, Conditions A, B, C and D, to clarify the explanation of the Conditions and Required Actions.

As noted in the response to RAI 16.2-32 (General Electric Letter MFN 06-431, dated November 13, 2006), DCD Tier 2, Revision 2, Chapter 16, LCO 3.5.2 is written based on an assumption that pending analyses will demonstrate that the ECCS safety function is maintained with the simultaneous failure of two GDCS injection branch lines and two trains of the GDCS equalizing subsystem. The Conditions, Required Actions, and Completion Times for LCO 3.5.2 are enclosed in brackets indicating that additional analysis or justification is required prior to approval. These sections of LCO 3.5.2 will remain enclosed in brackets until the DCD changes that provide the required justification are approved.

#### **DCD Impact**

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

#### **NRC RAI 16.2-98, Supplement 1**

*Technical Specification Limiting Condition for Operation (LCO) 3.5.2, Conditions A and B in Revision 3 of Tier 2 of the DCD allow plant operation with only 3 gravity driven cooling system injection and one equalizing line out of the 8 available injection and 4 equalizing lines. In the Bases it is stated that "This completion time is acceptable because the analysis described in Reference 4 determined that 3 injection branch lines [and 1 equalizing line] is sufficient to respond to the design basis LOCA."*

*In a tele-conference on March 26, 2007, GE stated that the analysis to support this LCO was not performed and that the LCO actions should be placed in "brackets" indicating that the information is either plant specific or not yet complete. GE stated that the brackets were left off in error. The staff requests that GE put the LCO 3.5.2, Conditions A and B, actions and associated Bases in brackets in the next revision of the DCD. If GE completes the supporting analysis by this time, the staff instead requests that GE submit the analysis.*

#### **GEH Response**

DCD Tier 2, Chapter 16, Specification 3.5.2, "Gravity-Driven Cooling System (GDCS) - Operating," Actions A, B, C, and D, and portions of Condition E, will be bracketed until supporting analysis is completed.

For consistency, DCD Tier 2, Chapter 16, Specification 3.5.1, "Automatic Depressurization System (ADS) - Operating," Actions A, B, C, and D, and portions of Condition E, will be bracketed until supporting analysis is completed. Specification 3.5.4, "Isolation Condenser System (ICS) - Operating," Actions A, B, and C, and portions of Condition D, will also be bracketed until supporting analysis is completed.

Corresponding DCD Tier 2, Chapter 16B Bases for these Actions will also be bracketed. For clarification the associated Specifications 3.5.1 and 3.5.2 Bases Reference to the supporting analysis will be revised to "{Supporting Analysis}" because this analysis is not a currently planned Topical Report. Bases for Specification 3.5.4 will add a bracketed Reference to "{Supporting Analysis}."

**DCD Impact**

DCD changes to Chapters 16 Specifications 3.5.1, 3.5.2, and 3.5.4 described above will be incorporated as shown in the attached markups. Corresponding Bases changes to Chapter 16B will be incorporated as described above (markups not attached).

ADS - Operating  
3.5.1

## 3.5 Emergency Core Cooling Systems (ECCS)

## 3.5.1 Automatic Depressurization System (ADS) - Operating

LCO 3.5.1      The ADS function of ten Safety Relief Valves (SRVs) and eight Depressurization Valves (DPVs) shall be OPERABLE.

APPLICABILITY:    MODES 1, 2, 3, and 4.

## ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
{A. One ADS SRV inoperable.	A.1    Restore ADS SRV to OPERABLE status.	Prior to entering MODE 2 or 4 from MODE 5}
{B. One DPV inoperable.	B.1    Restore DPV to OPERABLE status.	Prior to entering MODE 2 or 4 from MODE 5}
{C. Two ADS SRVs inoperable.	C.1    Restore one ADS SRV to OPERABLE status.	14 days}
{D. Two DPVs inoperable.	D.1    Restore one DPV to OPERABLE status.	14 days}

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. {Three or more ADS SRVs inoperable.  <u>OR</u>  Three or more DPVs inoperable.}	E.1 Be in MODE 3.  <u>AND</u>  E.2 Be in MODE 5.	12 hours          36 hours
<u>OR</u>  Required Action and associated Completion Time of Condition A, B, C, or D not met.		

## SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.1.1	Verify High Pressure Nitrogen Supply System (HPNSS) supply pressure to ADS SRVs is $\geq 1.13$ MPaG (164 psig).	31 days
SR 3.5.1.2	<p style="text-align: center;"><b>- NOTE -</b></p> <p>Not required to be met for one squib firing circuit intermittently bypassed under administrative controls.</p> <hr/> <p>Verify continuity of required firing circuits in squib-actuated valves.</p>	31 days



## 3.5 Emergency Core Cooling Systems (ECCS)

## 3.5.2 Gravity-Driven Cooling System (GDCS) - Operating

LCO 3.5.2 The following GDCS subsystems shall be OPERABLE:

- a. Eight branch lines of the injection subsystem; and
- b. Four trains of the equalizing subsystem.

APPLICABILITY: MODES 1, 2, 3, and 4.

## ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
{A. One branch line of the injection subsystem inoperable.	A.1 Restore branch line of the injection subsystem to OPERABLE status.	Prior to entering MODE 2 or 4 from MODE 5}
{B. One equalizing train inoperable.	B.1 Restore equalizing train to OPERABLE status.	Prior to entering MODE 2 or 4 from MODE 5}
{C. Two branch lines of the injection subsystem inoperable.	C.1 Restore one branch line of the injection subsystem to OPERABLE status.	14 days}
{D. Two equalizing trains inoperable.	D.1 Restore one equalizing train to OPERABLE status.	14 days}

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. {Three or more branch lines of the injection subsystem inoperable.	E.1 Be in MODE 3.	12 hours
<u>OR</u>	<u>AND</u>	
Three or more equalizing trains inoperable.}	E.2 Be in MODE 5.	36 hours
<u>OR</u>		
Required Action and associated Completion Time of Condition A, B, C, or D not met.		

## SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.2.1	Verify water level in each GDCS pool is $\geq 6.5$ meters (21.3 feet).	12 hours
SR 3.5.2.2	<p style="text-align: center;"><b>- NOTE -</b></p> <p>Not required to be met for one squib firing circuit intermittently bypassed under administrative controls.</p> <p>Verify continuity of required firing circuits in squib-actuated valves.</p>	31 days

ICS - Operating  
3.5.4

## 3.5 Emergency Core Cooling Systems (ECCS)

## 3.5.4 Isolation Condenser System (ICS) - Operating

LCO 3.5.4 Four ICS trains shall be OPERABLE.

APPLICABILITY: MODES 1 and 2,  
MODES 3 and 4 when < 2 hours since reactor was critical.

## ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
{A. One ICS train inoperable.	A.1 Restore ICS train to OPERABLE status.	14 days}
{B. Two ICS trains inoperable.	B.1 Restore one ICS train to OPERABLE status.	72 hours}
{C. Three ICS trains inoperable.	C.1 Restore one ICS train to OPERABLE status.	1 hour}
D. Required Action and associated Completion Time of Condition A, B, or C not met.  <u>OR</u>  {Four ICS trains inoperable.}	D.1 Be in MODE 3.	12 hours