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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 79 - Containment Systems - RAI Numbers 6.2-130, 6.2-136, and 6.2-137**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter.

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

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

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Reference:

1. MFN 06-393, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 79 Related to ESBWR Design Certification Application*, October 11, 2006

Enclosure:

1. MFN 07-270 - Response to Portion of NRC Request for Additional Information Letter No. 79 - Related to ESBWR Design Certification Application - Containment Systems - RAI Numbers 6.2-130, 6.2-136, and 6.2-137

cc:	AE Cubbage	USNRC (with enclosures)
	BE Brown	GE/Wilmington (with enclosures)
	GB Stramback	GE/San Jose (with enclosures)
	eDRF	0000-0066-7955 for RAI 6.2-130
		0000-0061-0515 for RAI 6.2-136
		0000-0061-0516 for RAI 6.2-137

Enclosure 1

MFN 07-270

Response to Portion of NRC Request for

Additional Information Letter No. 79

Related to ESBWR Design Certification Application

Containment Systems

RAI Numbers 6.2-130, 6.2-136, and 6.2-137

NRC RAI 6.2-130:

DCD Tier 2, Revision 1, Section 6.2.4.4, "Test and Inspection," states that individual CIVs are functionally tested by remote-manual operation from the control room. Will their automatic function also be tested by the input of simulated containment isolation signals to the protection system?

Revise the DCD to address this question.

GE Response:

The automatic function of the Containment Isolation Valves (CIVs) are periodically tested by ensuring actuation to the isolation position on actual or simulated isolation signals. DCD Tier 2, Subsection 6.2.4.4, will be revised in DCD Tier 2, Revision 4 to include this statement.

DCD Impact:

DCD Tier 2, Subsection 6.2.4.4, will be revised in DCD Tier 2, Revision 4, as shown in the attached markup.

6.2.4.4 Test and Inspections

~~The containment isolation function is scheduled to undergo periodic testing during reactor operation.~~The automatic functions of the Containment Isolation Valves (CIVs) are periodically tested by ensuring actuation to the isolation position on an actual or simulated isolation signal. The functional capabilities of power-operated isolation valves are tested remote-manually from the control room. By observing position indicators and changes in the affected system operation, the closing ability of a particular isolation valve is demonstrated.

NRC RAI 6.2-136:

DCD Tier 2, Revision 1, Section 6.2.5.3 describes the containment hydrogen monitors as safety-related and Seismic Category I, with two redundant, physically and electrically independent monitoring divisions. 10 CFR 50.44(c)(4)(ii) states:

> *Equipment for monitoring hydrogen must be functional, reliable, and capable of continuously measuring the concentration of hydrogen in the containment atmosphere following a significant beyond design-basis accident for accident management, including emergency planning.*

Draft Regulatory Guide 1.7, Rev. 3 (RG 1.7), states that safety-related hydrogen monitoring systems installed and approved by the NRC prior to October 16, 2003, are sufficient to meet these criteria. However, the ESBWR does not meet that requirement. The staff requires additional information:

(A) Per the guidelines of NUREG-0737, "Clarification of TMI Action Plan Requirements," item II.F.1, attachment 6, "Containment Hydrogen Monitor:"

a) To satisfy the requirement of being capable of continuously measuring the concentration of hydrogen in the containment atmosphere following a significant beyond design-basis accident, are the hydrogen monitors capable of measurement over a range of 0 to 10% hydrogen concentration under both positive and negative ambient pressure?

b) To satisfy the requirement of being functional and reliable, provide the accuracy of the hydrogen monitors and the placement of their sampling points, and justify that they are adequate for their intended function.

(B) Hydrogen monitors are not required to function during normal plant operation. RG 1.7,section C.2.1, provides guidance on meeting the functional requirements of the rule in terms of how soon the monitors should be functioning after initiation of safety injection during an accident. The guidelines are detailed, but generally result in the monitors needing to be functional within 90 minutes after the initiation of safety injection. This period of time includes equipment warm-up but not equipment calibration.

Do the ESBWR hydrogen monitors comply with these guidelines?

(C) Although the hydrogen monitors are outside of the containment, will the system remain functional and reliable when exposed internally to the temperature, pressure, humidity, and radioactivity of containment atmosphere during a significant beyond design-basis accident?

GE Response:

The hydrogen monitoring subsystem of the Containment Monitoring System (CMS) is safety-related, and the isolation valves that separate the H_2 monitor and its sample transport lines from the containment atmosphere are also safety-related. This is the part of the CMS referred to in DCD Tier 2, Subsection 6.2.5.3.

(A)(a) The instrument range will be dual and encompasses 0 to 10 percent and 0 to 30 percent hydrogen. This range will be met under the specified pressure conditions for the ESBWR design.

(A)(b) Accuracy of the hydrogen monitors from input to visual display will be ± [0.2] percent hydrogen on the 10 percent scale and ± [0.6] percent hydrogen on the 30 percent scale. Sampling points will be selected which allow for sample transport and monitoring of atmospheric hydrogen contents in the drywell and in the wetwell.

(B) Equipment warmup time to full on-line status will be evaluated during the specification and procurement process to ensure that the warmup time noted in Regulatory Guide 1.7, Revision 3, is not exceeded upon receipt of an actuation signal from an initiating event.

(C) Equipment chosen for hydrogen monitoring will be specified to meet the environmental and radiological requirements for its location and intended post-accident operations. Internal components will be evaluated to ensure that the instrument is qualified for the intended environmental and radiological conditions expected and for the required post-accident monitoring time frame.

DCD Impact:

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

NRC RAI 6.2-137:

DCD subsection 6.2.5.3 describes the containment oxygen monitors as safety-related and Seismic Category I, with two redundant, physically and electrically independent monitoring divisions. 10CFR 50.44(c)(4)(I) states:

> *Equipment for monitoring oxygen must be functional, reliable, and capable of continuously measuring the concentration of oxygen in the containment atmosphere following a significant beyond design-basis accident for combustible gas control and accident management, including emergency planning.*

RG 1.7 states that existing oxygen monitoring systems approved by the NRC prior to October 16, 2003, are sufficient to meet these criteria. However, the ESBWR does not meet that requirement. The staff requires additional information:

1) *To satisfy the requirement of being capable of continuously measuring the concentration of oxygen in the containment atmosphere following a significant beyond design-basis accident, provide the range of measurement capability of the oxygen monitors.*
2) *To satisfy the requirement of being functional and reliable, provide the accuracy of the oxygen monitors and the placement of their sampling points, and justify that they are adequate for their intended function.*
3) *Although the oxygen monitors are outside of the containment, will the system remain functional and reliable when exposed internally to the temperature, pressure, humidity, and radioactivity of containment atmosphere during a significant beyond design-basis accident?*

GE Response:

The oxygen monitoring subsystem of the containment monitoring system (CMS) is safety-related, and the isolation valves that separate the O_2 monitor and its sample transport lines from the containment atmosphere also are safety-related.

(1) The instrument range will be dual and encompasses 0 to 10 percent and 0 to 30 percent oxygen. This range will be met under the specified pressure conditions for the ESBWR design.

(2) Accuracy of the oxygen monitors from input to visual display will be ± [0.2] percent oxygen on the 10 percent scale and ± [0.6] percent oxygen on the 30 percent scale. Sampling points will be selected which allow for sample transport and monitoring of atmospheric oxygen contents in the drywell and in the wetwell.

(3) Equipment chosen for oxygen monitoring will be specified to meet the environmental and radiological requirements for its location and for intended post-accident operations. Internal components will be evaluated to ensure that the instrument is qualified for the intended environmental and radiological conditions expected and for the required post-accident monitoring time frame.

DCD Impact:

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