GE Energy

James C. Kinsey
Project Manager, ESBWR Licensing

PO Box 780 M/C J-70
Wilmington, NC 28402-0780
USA

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

MFN 07-009

Docket No. 52-010

April 4, 2007

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

Subject: **Response to Portion of NRC Request for Additional Information Letters No. 79 and 85 – Containment - RAI Numbers 6.2-125 and 6.2-150, and Revised Responses to RAI Numbers 6.2-111 and 6.2-129**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 and 2 letters. In addition, revised responses to NRC RAI Numbers 6.2-111 and 6.2-129, previously submitted via the Reference 3 letter, are provided based on the response to NRC RAI Number 6.2-125.

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

Sincerely,

Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

D068

References:

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

2. MFN 07-054, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 85 Related to ESBWR Design Certification Application*, January 19, 2007

3. MFN 06-461, Letter from David Hinds to U.S. Nuclear Regulatory Commission, *Response to Portion of NRC Request for Additional Information Letter No. 79 – Containment Isolation Function – RAI Numbers 6.2-104 through 6.2-117, 6.2-123, 6.2-124, 6.2-126, 6.2-128, and 6.2-129*, November 17, 2006

Enclosure:

1. MFN 07-009 – Response to Portion of NRC Request for Additional Information Letters No. 79 and 85 – Related to ESBWR Design Certification Application – Containment – RAI Numbers 6.2-125 and 6.2-150, and Revised Response to RAI Numbers 6.2-111 and 6.2-129

cc:

AE Cubbage	USNRC (with enclosures)
BE Brown	GE/Wilmington (with enclosures)
GB Stramback	GE/San Jose (with enclosures)
eDRF	0000-0062-0833R1, 0000-0065-4212

Enclosure 1

MFN 07-009

Response to Portion of NRC Request for

Additional Information Letters No. 79 and 85

Related to ESBWR Design Certification Application

Containment

RAI Numbers 6.2-125 and 6.2-150, and

Revised Response to RAI Numbers 6.2-111 and 6.2-129

NRC RAI 6.2-125:

DCD Tier 2, Revision 1, Section 6.2.4.3.2.2, "Effluent Lines from Containment," under the heading "Fuel and Auxiliary Pools Cooling System Suction Lines," states that subsection 9.1.3.3 contains additional information about the containment isolation design for the system including any justifications for deviation from the GDC 56 requirements.

Provide this information in Section 6.2.4.3.2.2.

Further, the design takes credit for a closed system outside containment as the second containment isolation barrier. As detailed in RAI 6.2-102, there are a number of guidelines in SRP 6.2.4, Rev. 2, RG 1.141, and ANS-56.2/ANSI N271-1976 which govern the design of a closed system outside containment when used as a containment isolation barrier. Address these guidelines in the DCD.

GE Response:

As described in the response to RAI 6.2-122, it is preferable not to provide duplicate information in multiple sections of Tier 2 of the Design Control Document (DCD). The current approach (using a reference to Subsection 9.1.3.3) avoids the risk of errors and inconsistencies in future updates to the DCD.

The Fuel and Auxiliary Pools Cooling System (FAPCS) is no longer being credited as a closed system outside containment, and as a result a second containment isolation valve has been added to the suppression pool supply line in series with the existing valve. Both valves are located outside the containment and as close to the penetration as possible. The second valve is not located inside containment because it could potentially be submerged by water during a severe accident. This arrangement is acceptable to meet the requirements of 10 CFR 50 Appendix A, GDC 56 and the additional guidelines for acceptable alternate containment isolation provisions for this class of line described in NUREG-0800, Standard Review Plan (SRP) 6.2.4, Section II.d.

In order to improve reliability for the Suppression Pool Cooling and Low Pressure Coolant Injection functions, and to address uncertainty in the Probabilistic Risk Analysis (PRA) safety goals, a parallel redundant flow path through containment has been created for the suppression pool supply and return penetrations. As a result, in addition to adding a second valve in series, there is now a second containment penetration (also containing two outboard containment isolation valves). Likewise, the suppression pool return flow path will now contain an additional penetration with a redundant pneumatic-operated outboard isolation valve and an inboard check valve. The supply and return lines each branch upstream of the containment penetration, and return to a single flow path downstream of the second containment isolation valve. Figures 6.2-125-1 and 6.2-125-2 illustrate this change.

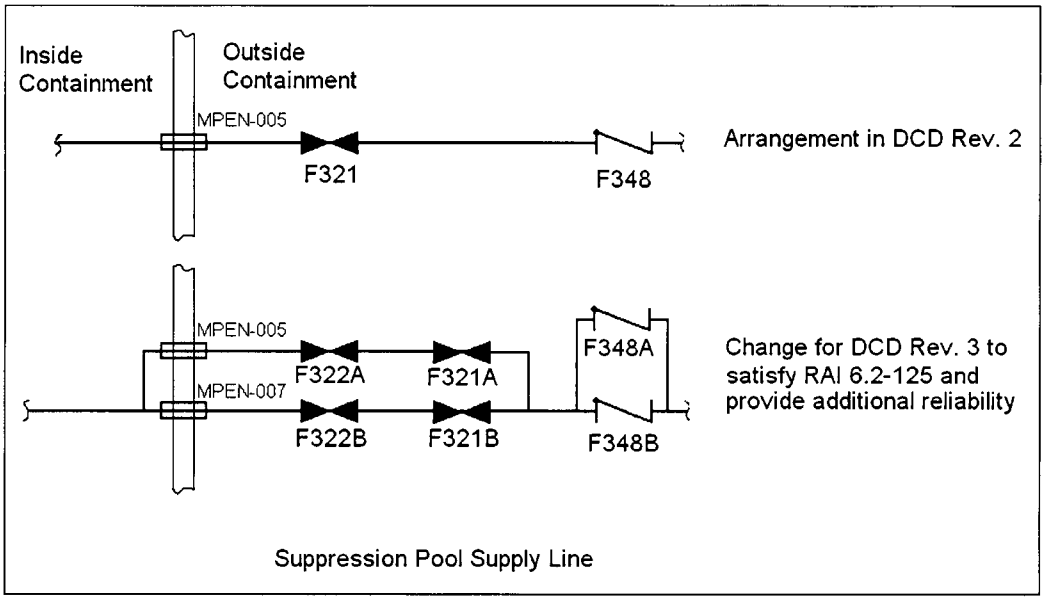

Figure 6.2-125-1

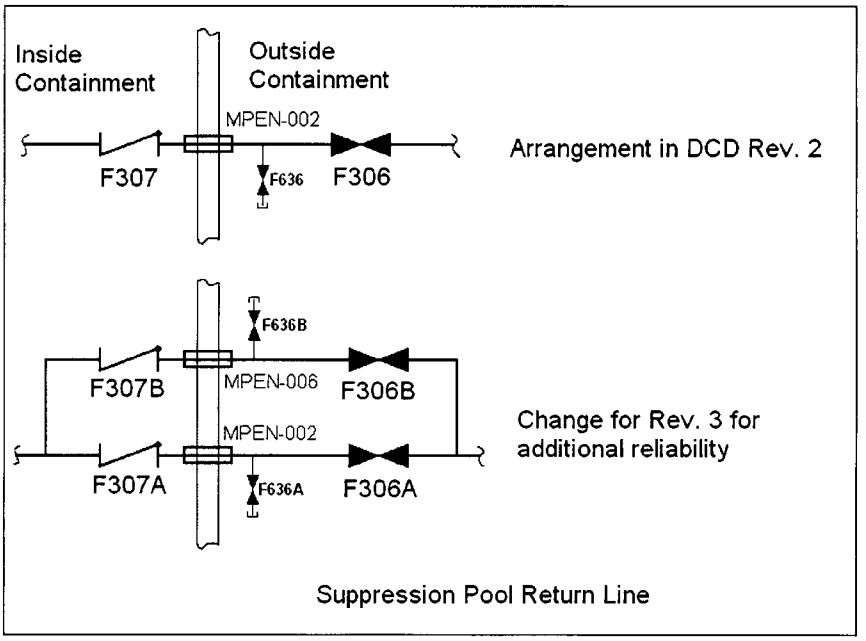

Figure 6.2-125-2

DCD Tier 2, Table 3.2-1, Table 3.9-8, Subsection 6.2.4.3.2.2, Table 6.2-33, Subsection 9.1.3, Figure 9.1-1, and Table 9.1-3 were revised in DCD Tier 2, Revision 3, to address these new design requirements. However, DCD Tier 2, Table 1.9-6, was not revised in DCD Tier 2, Revision 3, as necessary.

Additionally, there are two previously submitted RAI responses that must be revised to be consistent with the new valve arrangement. RAIs 6.2-111 and 6.2-129 were submitted to the

NRC in letter MFN 06-461, dated November 17, 2006, and revisions to these two RAI responses are shown in succeeding pages.

DCD Impact:

DCD Tier 2, Table 1.9-6, will be revised in DCD Tier 2, Revision 4, as noted in the attached markup. Table 3.2-1, Table 3.9-8, Subsection 6.2.4.3.2.2, Table 6.2-33, Subsection 9.1.3, Figure 9.1-1, and Table 9.1-3, also affected by this RAI response, were revised in DCD Tier 2, Revision 3.

Table 1.9-6

Summary of Differences from SRP Section 6

SRP Section	Specific SRP Acceptance Criteria	Summary Description of Difference	Subsection Where Discussed
6.2.4	One isolation valve inside and one isolation valve outside containment	ESBWR design takes specific exceptions to GDC 55 and GDC 56, while satisfying the intent.	6.2.4.3
		(1) FAPCS suppression pool suction line contains ~~one~~ two parallel flow paths through containment. Each flow path contains two isolation valves outside containment;	9.1.3~~.7~~
		(2) ICS piping contains two isolation valves inside containment; and	Tables 6.2-23 to 6.2-30
		(3) Containment Inerting System piping contains two isolation valves outside containment.	Tables 6.2-36 to 6.2-38

NRC RAI 6.2-150:

DCD, Tier 2, Revision 2, Section 6.2.1.1.4 states that "In order to prevent excessive negative pressure the drywell spray flow rate must be less than 227 m3/hr (1000 gpm)." Please state the assumptions used to calculate this spray flow rate, including the timing of spray initiation.

GE Response:

An analysis has been performed to determine the maximum negative differential pressures (drywell to wetwell, and drywell to reactor building) resulting from several different drywell spray initiation scenarios, including manual drywell spray initiation following a feedwater line break and a main steamline break inside containment, and an inadvertent drywell spray initiation with no break at the most limiting initial drywell, wetwell, and reactor building initial conditions. For each of these scenarios, drywell spray flow rate was assumed to be 2000 gpm. For additional conservatism and to account for uncertainties in the design of the drywell spray piping system, including drywell spray flow limiting design features, a value of 1000 gpm has been established as the maximum operating limit.

For the feedwater line and main steamline break scenarios, the analyses assume that the manual drywell spray injection is initiated at the worst possible time, which is the point in time when there is a low air content in the drywell relative to the wetwell. This occurs when the drywell pressure peaks and begins to decrease, and just prior to the drywell to wetwell vacuum breakers opening. The assumed temperature of the drywell spray water in each of these scenarios is 293°K.

The conclusion of these analyses is that the maximum negative differential pressures remain within the design criteria for each of the above scenarios.

DCD Impact:

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

Revised Response to NRC RAI 6.2-111:

DCD Tier 2, Revision 1, Section 6.2.4.2.3, "Compliance with General Design Criteria and Regulatory Guides," states, in part:

> *In general, all requirements of General Design Criteria 54, 55, 56, and Regulatory Guide 1.11 are met in the design of the containment isolation function.*

Why were GDC 57 and RG 1.141 not addressed as part of this statement?

GE Revised Response:

DCD Tier 2, Subsection 6.2.4.2.3, was revised in DCD Tier 2, Revision 3 to address GDC 57 and RG 1.141 design requirements.

DCD Impact:

DCD Tier 2, Subsection 6.2.4.2.3, was revised in DCD Tier 2, Revision 3. Please note that changes to Subsection 6.2.4.3.2.4 and Table 6.2-33 that accompanied the original response to this RAI are no longer valid.

Revised Response to NRC RAI 6.2-129:

DCD Tier 2, Revision 1, Section 6.2.4.3.2.4, "Evaluation Against General Design Criterion 57," states: "The ESBWR has no closed system lines penetrating the containment that require automatic isolation." Considering that, generally, closed systems inside containment do not require automatic isolation (e.g., remote-manual isolation is allowed), this is not very informative.

Are there any closed systems inside containment whose lines penetrate the containment? If so, describe their containment isolation provisions in the DCD. If not, clarify the DCD statement.

GE Revised Response:

Based on DCD Tier 2, Revision 3, Tables 6.2-33a, 6.2-39, 6.2-39a, and 6.2-40, there are seven different mechanical penetrations where 10 CFR 50 Appendix A, GDC 57 is designated as the applicable basis for the containment isolation valve arrangement. In each case, the containment isolation provisions, including the location of each valve, the valve type, and whether the primary actuation is automatic or remote manual, are described in the tables.

For the Fuel and Auxiliary Pool Cooling System penetration in Table 6.2-33a, the reference to 10 CFR 50 Appendix A, GDC 57, is in error, and will be revised in DCD Tier 2, Revision 4, to designate GDC 56 as the applicable basis for the containment isolation valve arrangement.

For each of the four Chilled Water System penetrations in Tables 6.2-39 and 6.2-39a, there is both an inboard and outboard isolation valve. Each valve receives automatic isolation signals from two different sets of two instrumentation divisions (i.e., for each penetration, one valve is actuated by either Division 1 or 3, while the other valve is actuated by either Division 2 or 4). Because there are two, independent isolation valves, there is no credit taken for the closed system inside containment as a containment barrier for any of these penetrations.

For each of the two High Pressure Nitrogen Gas Supply System penetrations in Table 6.2-40, there is an inboard check valve used as a process actuated isolation valve and an outboard isolation valve that receives automatic isolation signals from two different instrumentation divisions (i.e., for each penetration, the automatic isolation valve is actuated by either Division 2 or 4. Because there are two, independent isolation valves, there is no credit taken for the closed system inside containment as a containment barrier for any of these penetrations.

Based on the design of the penetrations where 10 CFR 50 Appendix A, GDC 57 is designated as the applicable basis for the containment isolation valve arrangement, Subsection 6.2.4.3.2.4 will be revised in DCD Tier 2, Revision 4, to state: "The ESBWR design does not credit any closed system inside containment as a containment barrier."

DCD Impact:

DCD Tier 2, Subsection 6.2.4.3.2.4, and Table 6.2-33a, will be revised in DCD Tier 2, Revision 4, as noted in the attached markups.

6.2.4.3.2.4 Evaluation Against General Design Criterion 57

The ESBWR ~~has no~~design does not credit any closed system ~~lines penetrating the~~inside containment ~~that require automatic isolation~~ as a containment barrier.

Table 6.2-33a

Containment Isolation Valve Information for the Fuel and Auxiliary Pools Cooling System

Penetration Identification	**G21-MPEN-0005**		**G21-MPEN-0002**	
Valve No.	F321A	F322A	F306A	F307A
Applicable Basis	GDC ~~57~~56	GDC ~~57~~56	GDC 56	GDC 56