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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 79 – Containment Systems - RAI Numbers 6.2-102, 6.2-103, and 6.2-122**

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

If you have any questions about the information provided here, please let me know.

Sincerely,

/Kathy Sedney for

David H. Hinds
Manager, ESBWR

D068

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 06-466 – Response to Portion of NRC Request for Additional Information Letter No. 79 – Related to ESBWR Design Certification Application – Containment Systems – RAI Numbers 6.2-102, 6.2-103, and 6.2-122

cc: AE Cubbage USNRC (with enclosures)
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Enclosure 1

MFN 06-466

Response to Portion of NRC Request for

Additional Information Letter No. 79

Related to ESBWR Design Certification Application

Containment Systems

RAI Numbers 6.2-102, 6.2-103, and 6.2-122

NRC RAI 6.2-102

DCD Tier 2, Revision 1, Sections 6.2.4.3.2.1 and 6.2.4.3.2.2, state that the passive containment cooling system (PCCS) has no containment isolation valves (CIVs). This is contrary to the explicit requirements of General Design Criterion (GDC) 56, which state that such lines require a CIV inside containment and another outside containment. It is also inconsistent with the guidance of Standard Review Plan (SRP), Section 6.2.4, Rev. 2, June 1996, Regulatory Guide (RG) 1.141 as well as the national standard ANS-56.2/ANSI N271-1976 on the implementation of the statement in GDC 56. This standard allows other isolation provisions if it can be demonstrated that the containment isolation provisions for a specific class of lines are acceptable on some other defined basis.

The heat exchanger modules and piping of the PCCS outside containment, form closed systems. As the justification for having no CIVs, the DCD states that the heat exchanger modules and piping are designed as extensions of the safety-related containment, and that the design pressure of the PCCS is greater than twice the containment design pressure and the design temperature is the same as the drywell design temperature.

This clearly does not satisfy the explicit requirements of GDC 56 of 10 CFR Part 50,Appendix A, for two CIVs per penetration. However, GDC 56 also allows other isolation provisions if it can be demonstrated that the containment isolation provisions for a specific class of lines are acceptable on some other defined basis.

Regulatory guidance on the implementation of the "other defined basis" provision is found in SRP 6.2.4, Rev. 2, and RG 1.141, "Containment Isolation Provisions for Fluid Systems," dated April 1978, which endorses ANS-56.2/ANSI N271-1976, "Containment Isolation Provisions for Fluid Systems." These documents contain two pertinent discussions: 1) Necessary design provisions of a closed system outside containment, and 2) Allowable containment isolation provisions for a closed system outside containment.

(1) Necessary design provisions of a closed system outside containment

SRP 6.2.4, Rev. 2, "Containment Isolation System," section II, "Acceptance Criteria," states, under heading e., that a closed system outside containment should have, among other things,"... a design temperature and pressure rating at least equal to that for the containment."

ANS-56.2/ANSI N271-1976, section 3.6.7, "Criteria for Closed Systems Outside Containment," is consistent: "(3) Withstand temperature and internal pressure equal to the containment design conditions."

Thus, the DCD's justification statement indicates only that the PCCS meets one of the criteria for a closed system outside containment. It is not sufficient to justify having no CIVs.

(2) Allowable containment isolation provisions for a closed system outside containment

SRP 6.2.4, Rev. 2, "Containment Isolation System," section II, "Acceptance Criteria," states ,under heading e.:

> *Containment isolation provisions for lines in engineered safety feature or engineered safety feature-related systems normally consist of two isolation valves in series. A single isolation valve will be acceptable if it can be shown that the system reliability is greater with only one isolation valve in the line, the system is closed outside containment, and a single active failure can be accommodated with only one isolation valve in the line. The closed system outside containment should be protected from missiles, designed to seismic Category I standards, classified Safety Class 2 (Ref. 9), and should have a design temperature and pressure rating at least equal to that for the containment. The closed system outside containment should be leak tested, unless it can be shown that the system integrity is being maintained during normal plant operations. For this type of isolation valve arrangement the valve is located outside containment, and the piping between the containment and the valve should be enclosed in a leak tight or controlled leakage housing. If, in lieu of a housing, conservative design of the piping and valve is assumed to preclude a breach of piping integrity, the design should conform to the requirements of SRP Section 3.6.2. Design of the valve and/or the piping compartment should provide the capability to detect leakage from the valve shaft and/or bonnet seals and terminate the leakage.*

ANS-56.2/ANSI N271-1976, section 3.6.4, "Single Valve and Closed System Both Outside Containment," contains consistent criteria:

> *For the isolation function of an engineered safety feature or system required to test an engineered safety feature, one barrier is required after the occurrence of a single active failure. Normally, this is accomplished by providing two isolation valves in series. If it is not practical to locate a valve inside containment and if it can be shown that a single active failure can be accommodated with only one valve in the line and that fluid system reliability is enhanced by the single valve over two valves in series while still maintaining at least a single mechanical barrier, and* ***if the closed system outside containment is treated as an extension of containment,*** *[emphasis added] then one valve is acceptable. The closed system shall be leak tested in accordance with 5.3 of this Standard unless it can be shown by inspection that system integrity is being maintained for those systems operating during normal plant operation at a pressure equal to or above the containment design pressure.*
>
> *The single valve and piping between the containment and the valve shall be enclosed in a protective leak tight or controlled leakage housing to prevent leakage to the atmosphere.*

In other words, if the PCCS satisfies the criteria for a closed system outside containment, it needs one CIV per penetration, located outside containment. The justification provided in the DCD that the closed system is treated as an extension of containment does not, per the ANS standard, eliminate the need for one CIV; it is, in fact, necessary to justify having only one CIV instead of two.

Revise the DCD to provide a design which is consistent with the staff's regulatory position as detailed in SRP 6.2.4 and RG 1.141, or provide additional justification for maintaining the current design.

GE Response

As described in the DCD, the passive containment cooling system (PCCS) contains no containment penetrations, but is instead considered an extension of the containment boundary. This is an acceptable justification for the absence of containment isolation valves because as an extension of containment, the PCCS does not fall under the scope of GDC 56, SRP 6.2.4 Rev. 2 (July 1981), ANS-56.2/ANSI N271-1976, or RG 1.141. Rather, the PCCS is designed in accordance with SRP 6.2.1.1.C Rev. 6 (August 1984), which is the guideline for pressure suppression type BWR containments.

The classification of PCCS components as an extension of containment is justified by the description provided in DCD Tier 2, Section 6.2.2.3. This section contains a detailed explanation of all the requirements that shall be met by the PCCS as an extension of containment. As described in this section, the PCCS components located above the drywell shall be designed in accordance with GDC 2, 4, 16, 38, 39, 40, 51, 52, and 53. Compliance with SRP 6.2.1.1.C also requires that GDC 50 be satisfied, therefore a statement to this effect will be added to DCD Section 6.2.2.3.

DCD Impact

DCD Section 6.2.2.3 will be modified as shown in the attached markup.

NRC RAI 6.2-103

DCD Tier 2, Revision 1, Table 1.9-6, "Summary of Differences from SRP Section 6," in its entry for SRP 6.2.4, lists three systems for which the containment isolation provisions differ from the specific SRP acceptance criteria of one CIV inside and one CIV outside containment. However, the PCCS is not mentioned, even though it has no CIVs and does not conform to the provisions of SRP 6.2.4, as discussed in RAI 6.2-102.

The Process Radiation Monitoring System is also not mentioned, even though it has both CIVs outside containment.

Add the PCCS and the Process Radiation Monitoring System to Table 1.9-6 or change their designs to bring them into conformance with SRP 6.2.4.

GE Response

As described in the response to RAI 6.2-102, the Passive Containment Cooling System (PCCS) components located above the drywell are classified as an extension of the containment boundary as opposed to a closed system outside of containment. Therefore the PCCS does not require containment isolation valves and should not be included in DCD Table 1.9-6.

The fission product monitoring portion of the Process Radiation Monitoring System does contain lines that penetrate containment. However, as described in the response to RAI 6.2-127, these are considered sample lines, approximately 25 mm in diameter, which meet Quality Group B requirements, and satisfy the containment isolation requirements of RG 1.11. Therefore GE considers these lines to be in accordance with SRP 6.2.4, Section II.6.a.

DCD Impact

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

NRC RAI 6.2-122

DCD Tier 2, Revision 1, Section 6.2.4.3.2.1, "Influent Lines to Containment," under the heading "Fuel and Auxiliary Pool Cooling System," 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 6.2.4.3.2.1.

GE Response

In order to minimize the risk of errors and inconsistencies in future DCD updates, it is preferable to provide a detailed description in only one location and reference it as needed in other sections. By taking this approach, fewer DCD changes will be required if this information needs to be revised in the future. Regulatory Guide 1.70 supports this approach.

DCD Impact

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