



GE Energy

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MFN 06-450

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U.S. Nuclear Regulatory Commission
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Subject: **Response to Portion of NRC Request for Additional Information
Letter No. 65 – Electric Power – RAI Numbers 8.2-1 through 8.2-11**

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,

A handwritten signature in cursive script that reads "David H. Hinds for".

David H. Hinds
Manager, ESBWR

MFN 06-450

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Reference:

1. MFN 06-353, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 65 Related to ESBWR Design Certification Application*, September 26, 2006

Enclosure:

1. MFN 06-450 – Response to Portion of NRC Request for Additional Information Letter No. 65 – Related to ESBWR Design Certification Application – Electric Power – RAI Numbers 8.2-1 through 8.2-11

cc: AE Cubbage USNRC (with enclosures)
GB Stramback GE/San Jose (with enclosures)
eDRF 0000-0060-7979

Enclosure 1

MFN 06-450

Response to Portion of NRC Request for

Additional Information Letter No. 65

Related to ESBWR Design Certification Application

Electric Power

RAI Numbers 8.2-1 through 8.2-11

NRC RAI 8.2-1

Auxiliary Transformer Sizing Margins.

The description of the offsite power system notes that the reserve auxiliary transformers are the same size as the unit auxiliary transformers and function as a backup source for each other. DCD Tier 2, Rev. 1, Figure 8.1-1 shows that both transformers feed two 13.8 kilovolt (kV) buses and two 6.9 kV buses. However, the figure also shows that both reserve auxiliary transformers also feed a third common 13.8 kV bus (Bus AB). Describe the loading on bus AB and compare the maximum combined connected loading on the reserve auxiliary transformers to their load ratings.

GE Response

Figure 8.1-1 has been revised to delete the third common 13.8 kV bus (bus AB). DCD Tier 2, Rev 2 reflects this change.

DCD Impact

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

NRC RAI 8.2-2

Clarify whether the PIP buses are fed with a non-segregated phase bus (page 8.2-2) or from an underground cable per DCD Tier 2, Rev. 1, Section 8.2.4.4 (page 8.2-5).

GE Response

PIP Buses will be fed with a non-segregated phase bus. DCD Tier 2, Rev. 2 reflects this change.

DCD Impact

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

NRC RAI 8.2-3

Inspection and Testing of Generator Breaker Reliability [General Design Criteria (GDC) 18]. DCD Tier 2, Rev. 1, Section 8.2.2, Analysis, of the DCD states the reliability of the generator breakers compares favorably with the probability of failure of the normal preferred offsite supply due to other causes. Provide a comparison of generator breaker reliability with the probability of failure of the normal preferred supply. Provide the basis for this assessment. Confirm that the comparison is between the 500 kV circuit breakers and the 500 kV system.

GE Response

Figure 8.1-1 was revised to relocate the generator circuit breaker between the low side of the main transformer and the main generator. Consequently, this circuit breaker is no longer rated at 500 kV. Therefore, the analysis justifying the reliability of a 500 kV breaker was deleted from DCD Tier 2, Rev. 2.

DCD Impact

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

NRC RAI 8.2-4

Loss of All ac Power (10 CFR 50.63). The statement that the ESBWR does not rely on offsite power does not appear to agree with the statement in Appendix 8B which implies that the control rod drive (CRD) pumps are required for inventory control. Please clarify.

GE Response

Appendix 8B was deleted from DCD Tier 2, Rev. 2 as it was a duplication of Subsection 15.5.5. Refer to Subsection 15.5.5 for clarification.

DCD Impact

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

NRC RAI 8.2-5

In Section 8.2.4, identify a COL item to address the following:

- (A) In Section 8.2.4.10, provide a statement confirming that the unit addition to the grid is reviewed and accepted by the applicable grid reliability organization such as the North American Reliability Council (NERC), recognized Regional Transmission Organization (RTO), and/or the Independent System Operator (ISO).*
- (B) In Section 8.2.4.10, provide a statement that the stability analysis is coordinated, reviewed and accepted by the applicable grid reliability organization such as the NERC recognized RTO or the ISO.*
- (C) In Section 8.2.4.6, provide a statement that the protective relaying between the unit and the grid is coordinated, reviewed and accepted by the applicable grid reliability organization such as NERC recognized RTO or the ISO.*

GE Response

DCD Tier 2, Rev. 2 adds the above COLA requirements in Subsections 8.2.4.6 and 8.2.4.10. It is the COL applicant's responsibility to seek approvals from specific local, regional and federal agencies as required.

DCD Impact

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

NRC RAI 8.2-6

Design Basis Interface Requirements (Section 8.2.3). DCD Tier 2, Rev. 1, Section 8.2.3 of the DCD states that a minimum of two transmission lines must be sized for the shutdown electrical loads. The auxiliary transformer size noted in Figure 8.1-1, sheet 1, indicates an auxiliary transformer rated for a maximum of 100MW. Each transmission path must be sized for the full 1600 MW rated output of the unit. Is this statement implying that a sub-transmission system could be used as the source of the normal or alternate preferred offsite power?

GE Response

There is no sub-transmission system to be used as the source for the normal or alternate preferred offsite power. DCD Tier 2, Rev. 2 reflects this change.

DCD Impact

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

NRC RAI 8.2-7

Transformer Fire Barrier. DCD Tier 2, Rev. 1, Section 8.2.3, page 8.2-4, states that fire barriers exist between the reserve auxiliary transformer and the unit auxiliary transformer. Confirm that fire barriers are also provided between the three phases of the main transformer.

GE Response

Fire barriers are provided between the three phases of the main transformer. DCD Tier 2, Rev. 2 reflects this change.

DCD Impact

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

NRC RAI 8.2-8

Maximum House (Auxiliary) Loads. DCD Tier 2, Rev. 1, Sections 8.2.4.3 and 8.2.4.4, state that the auxiliary load is 210 MW and 0.9 pf. Confirm this value and explain why it is so high compared with conventional boiling water reactors (BWRs). Clarify the apparent discrepancy with DCD Tier 2, Rev. 1, Section 8.2.3 which states the transformers are rated for 100 MW.

GE Response

This conservative estimated value for the total house load has been deleted from the DCD Tier 2, Rev. 2. A more realistic figure can only be determined during the detail design phase. However, because both the electrical and the thermal output of an ESBWR are significantly higher than previous BWRs, the total house load will be proportionally higher.

DCD Impact

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

NRC RAI 8.2-9

Generator Circuit Breaker (8.2.4.12). Standard Review Plan (NUREG 0800), Section 8.2, Appendix A, Guidelines for Generator Circuit Breakers/Load Break Switches, was written for medium voltage circuit breakers (typically rated less than 25 kV) between the generator and the main (step-up) transformer. DCD Tier 2, Rev. 1, Figure 8.1-1, Electrical Power Distribution System One Line Diagram, shows the generator on the high voltage side of the main transformer. A 500 kV circuit breaker is a completely different design than a 25 kV circuit breaker. Describe what attributes from Appendix A will be applied to the generator circuit breakers for ESBWR units. Identify unique characteristics, if any, that may be required to be different than standard 500 kV switchyard transmission circuit breakers.

GE Response

Figure 8.1-1 was revised to relocate the generator circuit breaker between the low side of the main transformer and the main generator. Consequently, this circuit breaker is no longer rated at 500 kV and considered as a medium voltage circuit breaker. Therefore, NUREG-0800, Section 8.2, Appendix A guidelines are applicable to the main generator circuit breaker.

DCD Impact

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

NRC RAI 8.2-10

Degraded Voltage (8.2.4.13). Confirm that those 6.9 kV PIP buses that ultimately power the safety-related Class 1E battery chargers and the Class 1E uninterruptible power supplies will have degraded voltage protection.

GE Response

Isolation power centers that feed the Class 1E inverters and battery chargers will be provided protection from degraded voltage. The degraded voltage issue will be addressed in Subsection 8.2.4.12 of DCD Tier 2, Rev. 3.

DCD Impact

DCD Tier 2, Rev.2, Subsection 8.2.4.12 will be revised by Revision 3 to incorporate this change.

NRC RAI 8.2-11

DCD Tier 2, Rev. 1, References (8.2.5). Identify additional applicable reference to standards for high voltage circuit breakers, station and switchyard grounding and station and switchyard lightning protection.

GE Response

Refer to Subsection 8A1.2 and 8A.4 for the above references.

DCD Impact

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