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MFN 06-431

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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 63 Related to ESBWR Design Certification Application – Technical Specifications – RAI Numbers 16.0-2 through 16.0-7, 16.2-10, 16.2-12 through 16.2-22, 16.2-25, 16.2-31 through 16.2-40, 16.2-43, 16.2-44, 16.2-46 through 16.2-49, 16.2-51, 16.2-53, 16.2-55 through 16.2-72, and 16.2-78 through 16.2-80**

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 06-375, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 63 Related to ESBWR Design Certification Application,* October 4, 2006

Enclosure:

1. MFN 06-431 – Response to Portion of NRC Request for Additional Information Letter No. 63 Related to ESBWR Design Certification Application – Technical Specifications – RAI Numbers 16.0-2 through 16.0-7, 16.2-10, 16.2-12 through 16.2-22, 16.2-25, 16.2-31 through 16.2-40, 16.2-43, 16.2-44, 16.2-46 through 16.2-49, 16.2-51, 16.2-53, 16.2-55 through 16.2-72, and 16.2-78 through 16.2-80

cc: AE Cubbage USNRC (with enclosures)
GB Stramback GE/San Jose (with enclosures)
eDRFs 59-5537, 59-5540, 59-5595, 59-5596

Enclosure 1

MFN 06-431

Response to Portion of NRC Request for

Additional Information Letter No. 63

Related to ESBWR Design Certification Application

- Technical Specifications -

RAI Numbers 16.0-2 through 16.0-7, 16.2-10, 16.2-12 through 16.2-22, 16.2-25, 16.2-31 through 16.2-40, 16.2-43, 16.2-44, 16.2-46 through 16.2-49, 16.2-51, 16.2-53, 16.2-55 through 16.2-72, and 16.2-78 through 16.2-80

NRC RAI 16.0-2

Explain the purpose of each bracket used in the ESBWR Technical Specifications (TS) and Bases, and ensure a reviewer's note is provided when necessary.

GE Response

The purpose of the brackets used in the ESBWR Technical Specifications (TS) and Bases is to identify the following items.

- Plant-specific Combined License (COL) Information Items.
- Items, that due to resolution timing, will remain open during Design Control Document (DCD) review but are expected to be resolved prior to Design Certification.

The majority of the current bracketed items in the ESBWR TS and Bases are expected to be resolved, and brackets eliminated, by the issuance of the final DCD Chapters 16 and 16B revision. Any bracketed information remaining in the final DCD Chapters 16 and 16B will be provided with Reviewer's Notes to clarify the purpose of the brackets.

DCD Impact

DCD Tier 2, Chapters 16 and 16B, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.0-3

Provide a list of all the applicable TSTF travelers (including any currently under review), which have not been incorporated in the NUREG-1434, Rev. 3.1, Standard TS (STS), but are included in the ESBWR TS. Explain any ESBWR TS deviations from the TSTF travelers.

GE Response

ESBWR Technical Specifications (TS) have adopted the following Technical Specification Task Force (TSTF) travelers, which have not been incorporated into NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6," Revision 3.1.

- TSTF-423-A, Revision 0, Technical Specification End States, NEDC-32988-A (The Consolidated Line Item Improvement Process (CLIIP) Notice of Availability for TSTF-423-A was published in the Federal Register (71 FR 14726) on March 23, 2006)
- TSTF-451-T, Revision 0, Correct the Battery Monitoring and Maintenance Program and the Bases for SR 3.8.4.2
- TSTF-458-T, Revision 0, Removing Restart of Shutdown Clock for Increasing Suppression Pool Temperature
- TSTF-484, Revision 0, Use of TS 3.10.1 for Scram Testing Activities

Deviations from the above listed TSTFs reflected in the ESBWR TS, Revision 1, are as follows.

TSTF-423-A revised TS end states for selected Required Actions. These Required Actions were revised to allow the plant to stay in Mode 3. During adoption into the ESBWR TS, TSTF-423-A was modified to reflect the ESBWR design. More detailed discussions of the applicability of TSTF-423-A to the ESBWR design and the deviations from the traveler will be addressed in the response to NRC RAI 16.0-7.

TSTF-451-T includes two changes. The first change is a revision to the NUREG-1434, TS 5.5.14, Battery Monitoring and Maintenance Program (ESBWR TS 5.5.10). This first change revises this program description to require actions to equalize and test battery cells with electrolyte level below the top of the plates, not below the minimum established design limit. ESBWR TS 5.5.10 is consistent with this first change from TSTF-451-T. The second change revises the Bases for NUREG-1434 SR 3.8.4.2 (ESBWR SR 3.8.1.2 and SR 3.8.2.2) to be consistent with the associated TS Surveillance. The ESBWR Bases for SR 3.8.1.2 and SR 3.8.2.2 will be revised to adopt this second change from TSTF-451-T.

TSTF-458-T modifies Actions D and E of NUREG-1434 TS 3.6.2.1, "Suppression Pool Average Temperature" (ESBWR TS 3.6.2.1, "Suppression Pool Average Temperature"). TSTF-458-T revises the entry condition for NUREG-1434 TS 3.6.2.1 Action D to "Suppression pool average temperature > [110]°F" by eliminating the upper temperature limit of the condition (i.e., but ≤ [120]°F) and removes the "Be in MODE 4" Required Action from NUREG-1434 TS 3.6.2.1 Action E. ESBWR TS 3.6.2.1 Action D reflects the adoption of the revised entry condition of TSTF-458-T, as modified by the ESBWR specific suppression pool temperature for this condition (i.e., 120°F). However, the change to NUREG-1434 TS 3.6.2.1 Action E reflected in TSTF-458-T has not been adopted in Revision 1 of ESBWR TS 3.6.2.1 Action E. ESBWR TS 3.6.2.1 will be revised to adopt this change by eliminating the "Be in MODE 5" Required Action

from Action E. (It should be noted that ESBWR TS Mode 5 is equivalent to NUREG-1434 TS Mode 4.)

TSTF-484 revised NUREG-1434 TS 3.10.1, "Inservice Leak and Hydrostatic Testing Operation" (ESBWR TS 3.10.1, "Inservice Leak and Hydrostatic Testing Operation") to extend this special operation for inservice leak and hydrostatic testing to apply to include operations where reactor coolant temperature exceeds 200°F as a consequence of maintaining reactor pressure for inservice leak and hydrostatic test or as a consequence of maintaining reactor pressure for control rod scram time testing initiated in conjunction with an inservice leak or hydrostatic test. ESBWR TS 3.10.1 and the associated Bases reflect the adoption of TSTF-484, except for minor editorial changes. ESBWR TS 3.10.1 and associated Bases will be revised to eliminate these minor editorial differences from TSTF-484.

In addition, several NRC RAIs request GE incorporate other TSTFs that are not currently included in NUREG-1434, or address TSTFs (i.e., TSTF-360) that were previously approved and incorporated in NUREG-1434 and are currently being revised by the industry and the NRC. A brief summary of these is as follows.

- TSTF-493, Clarify Application of Setpoint Methodology for LSSS Functions, will be addressed in response to NRC RAI 16.2-25.
- TSTF-448, Control Room Habitability, will be addressed in response to NRC RAI 16.2-54.
- TSTF-360, DC Electrical Rewrite, will be addressed in NRC RAIs 16.2-55, 16.2-56, 16.2-57, and 16.2-60.
- TSTF-497, Limit Inservice Testing Program SR 3.0.2 Application to Frequencies of 2 Years or Less, will be addressed in NRC RAI 16.2-69.

DCD Impact

DCD Tier 2, Chapters 16 and 16B, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.0-4

Beginning with LCO 3.0.3, and for each Specification with shutdown actions, justify the time allowed to reach the specified end state, and why each end state is appropriate (Mode 3, Mode 4, or Mode 5).

GE Response

LCO 3.0.3 of Revision 1 of the ESBWR Technical Specifications (TS) currently requires action to be initiated within 1 hour to place the unit, as applicable, in Mode 2 within 7 hours, Mode 3 within 13 hours, Mode 4 within 37 hours and to initiate action within 73 hours to place the unit in Mode 5.

LCO 3.0.3 will be revised to require action to be initiated within 1 hour to place the unit, as applicable, in Mode 2 within 7 hours, Mode 3 within 13 hours, Mode 4 within 25 hours, and Mode 5 within 37 hours. The times proposed to reach the specified modes are consistent with the capabilities of the ESBWR design and ensure that the required modes can be reached from full power conditions in an orderly manner without challenging safety systems. The LCO 3.0.3 specified end states are appropriate since they result in placing the plant in a mode or condition in which the TS LCO, that required LCO 3.0.3 to be entered, is not applicable. The revised times reflect the continued efforts to reach Cold Shutdown conditions within 37 hours, which is consistent with the existing LCO 3.0.3 requirements for all Standard Technical Specifications as well as the approved AP1000 Generic Technical Specifications.

For Specifications with shutdown actions, the times allowed to reach the specified end states are consistent with the times provided in the proposed revision to ESBWR LCO 3.0.3 (i.e., 6 hours to reach Mode 2, 12 hours to reach Mode 3, and 36 hours to reach Mode 5). The specified end states are appropriate since, in general, they result in placing the plant in a mode or condition in which the TS LCO is not applicable (i.e., exiting the Applicability). For those TS LCOs with end states that do not result in exiting the Applicability, these TS LCOs and their associated end states will be addressed in the response to NRC RAI 16.0-7.

DCD Impact

DCD Tier 2, Chapter 16, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.0-5

Justify exclusion of the following STS from the ESBWR TS by demonstrating they do not satisfy the inclusion requirements of 10 CFR 50.36:

a. Section 3.7 (Service Water System and Ultimate Heat Sink (Cooling Towers), Control Room Fresh Air System, Control Room Heating Ventilation and Air Conditioning System);

b. Section 3.9 (Reactor Water Cleanup/Shutdown Cooling System);

c. Section 5.5 (Ventilation Filter Test Program, Diesel Generator Fuel Oil Testing Program).

GE Response

In response to NRC RAI 16.0-1, GE completed a systematic and comprehensive evaluation of Revision 1 of the ESBWR DCD to determine the ESBWR process variables, design features, operating restrictions, and structures, systems, or components (SSCs) that meet one or more of the four criteria in 10 CFR 50.36(c)(2)(ii). This evaluation was used to verify that Revision 1 of DCD Chapter 16 includes the Limiting Conditions for Operations (LCOs) required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. The evaluation determined that the ESBWR systems discussed below did not meet the criteria for inclusion in the Technical Specifications. The results of this evaluation were provided in GE letter MFN 06-263, dated August 8, 2006.

a. In Section 3.7 of NUREG-1434, Revision 3.1:

- The system equivalent in intent to the Standby Service Water System and Ultimate Heat Sink (UHS) are the ESBWR Isolation Condenser/Passive Containment Cooling (IC/PCC) pools, which reject all of the heat necessary to the atmosphere to meet the safety analyses acceptance criteria for the first 72 hours following a design basis event. The IC/PCC pools are included in ESBWR Technical Specification 3.7.5. The ESBWR non-safety Plant Service Water System and Main Cooling Tower do not provide required cooling to any safety-related system.
- Refer to the response to RAI 16.2-52 for a discussion of the Technical Specification requirements for the ESBWR systems equivalent in intent to the Control Room Fresh Air System and Control Room Air Conditioning System contained in Section 3.7 of NUREG-1434, Revision 3.1.

b. The results of the evaluation discussed in response to NRC RAI 16.0-1 determined that the cleanup function and the decay heat removal function of the non-safety related RWCU/SDC System do not meet any of the four criteria in 10 CFR 50.36(c)(2)(ii). Instead, refer to the response to RAI 16.2-74 for a discussion of the safety-related systems for decay heat removal included in the ESBWR Technical Specification requirements equivalent in intent to the Residual Heat Removal (RHR) System contained in Section 3.9 of NUREG-1434, Revision 3.1.

c. In Section 5.5 of NUREG-1434, Revision 3.1:

- The Ventilation Filter Test Program is not needed in the ESBWR Technical Specifications because there are no ventilation filtration systems credited with meeting

the safety analyses acceptance criteria for the first 72 hours following a design basis event. All ventilation filtration systems are non-safety in the ESBWR.

- The Diesel Generator Fuel Oil Testing Program is not needed in the ESBWR Technical Specifications because there are no diesel generators needed to operate in order to meet the safety analyses acceptance criteria for the first 72 hours following a design basis event. All diesel generators are non-safety in the ESBWR.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 or Chapter 16B as a result of this RAI.

NRC RAI 16.0-6

Page 16.0-1 of DCD Tier 2, Rev. 1, Chapter 16, TS reference NUREG-1434 Rev. 3.0, but appear to be using Rev. 3.1. Clarify the version used and revise the ESBWR TS accordingly.

GE Response

ESBWR Technical Specifications (TS) have adopted the Technical Specification Task Force (TSTF) travelers incorporated into NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6," Revision 3.1, to the extent practical for the ESBWR design.

The reference on page 16.0-1 of DCD Tier 2, Chapter 16, to NUREG-1434, Revision 3, will be changed to NUREG-1434, Revision 3.1.

DCD Impact

DCD Tier 2, Chapter 16, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.0-7

The Abstract to NEDC-32988-A (ML030170060) states, "the analyses conclude that plant safety and operational improvements can be achieved by remaining in hot shutdown for several inoperable conditions while equipment is being restored. The proposed end state improvements provide more systems and operational flexibility while avoiding risk sensitive cold shutdown required actions and alignments. The conclusions are applicable for all BWR products (BWR-2 through 6)." Justify applying the topical report to the ESBWR design.

The NRC's letter regarding this topical report states, "licensees requesting a license amendment to revise their end states must include in their amendment requests plant-specific information addressing the stipulations identified in Section 7.0 of the SE." Address these stipulations.

Identify LCOs where TSTF-423 is applied to the ESBWR. For each LCO where TSTF-423 end states are requested, provide justification. Follow the example provided as item 17 on page 46 of NEDC-32988-A.

GE Response

The basis for TSTF-423-A, Revision 0, "Technical Specifications End States, NEDC-32988-A," is considered to be applicable to the ESBWR. As such, the concepts reflected in TSTF-423-A, Revision 0, have been adopted in the ESBWR Technical Specifications (TS). A revision to topical report, NEDO-33201, "ESBWR Design Certification Probabilistic Risk Assessment," or a separate topical report concerning ESBWR TS end states will be provided that will include risk-based support for the application of each of the end state relaxations in the ESBWR TS. The topical report will also provide justifications, equivalent in scope to those provided in NEDC-32988-A, for the application of each of the end state relaxations in the ESBWR TS. It is anticipated that the justifications provided in the topical report will support the current qualitative assessments justifying the application of the proposed end state relaxations in the ESBWR TS discussed below. It is expected that the topical report revision, or separate topical report, will be submitted to the NRC for review and approval by September 2007.

The stipulations identified in Section 7.0 of the NRC Safety Evaluation for NEDC-32988 and addressed in TSTF-IG-05-02, Implementation Guidance for TSTF-423, Revision 0, "Technical Specifications End States, NEDC-32988-A" will be referenced and committed to in a subsequent revision to each of the associated ESBWR Bases for the TS for which the end state allowances are adopted.

The ESBWR TS identified below are presented in Revision 1 of DCD Chapters 16 and 16B with an end state of Mode 3, which is consistent with corresponding requirements presented in TSTF-423-A for the comparable ESBWR system.

TS 3.6.1.1	Containment
TS 3.6.3.1	Reactor Building
TS 3.7.1	Emergency Breathing Air System (EBAS)

The ESBWR TS identified below will be revised in a subsequent revision to the DCD to align with allowances justified in TSTF-423-A for the comparable ESBWR system.

TS 3.4.1 Safety Relief Valves (SRVs)
(In a subsequent revision to the DCD, a Mode 3 end state relaxation will be applied and the requirement to proceed to Mode 5 will be applied when 16 or more SRVs are inoperable.)

TS 3.5.1 Automatic Depressurization System (ADS) – Operating
(In a subsequent revision to the DCD, the end states will be revised to add a requirement to proceed to Mode 5 when [three] or more ADS SRVs are inoperable or when [three] or more Depressurization Valves are inoperable.)

TS 3.5.2 Gravity-Driven Cooling System (GDCS) – Operating
(In a subsequent revision to the DCD, the end states will be revised to add a requirement to proceed to Mode 5 when [three] or more branch lines of the injection subsystem are inoperable or when [three] or more equalizing trains are inoperable.)

TS 3.6.1.6 Wetwell-to-Drywell Vacuum Breakers
(In a subsequent revision to the DCD, the end states will be revised to add a requirement to proceed to Mode 5 when two or more vacuum breakers are inoperable.)

The ESBWR TS identified below will be reformatted, in a subsequent revision to the DCD, to more closely align with the TSTF-423-A format (for the comparable ESBWR system) for splitting Actions applicable to remain in Mode 3 versus Actions requiring shutdown to Mode 5. No new technical change will be introduced with the revision to these Specifications.

TS 3.8.1 24-hour DC Sources – Operating

TS 3.8.5 Inverters – Operating

TS 3.8.7 Distribution Systems – Operating

The ESBWR TS identified below are Specifications for systems that support the primary containment function assumed in design basis events. While these support systems were not addressed in TSTF-423-A or the associated NEDC-32988, the justification for the end state relaxation for primary containment inoperability also applies to these primary containment support systems. As such, the Mode 3 end state relaxation has been applied to these Specifications.

TS 3.6.1.2 Containment Air Lock

TS 3.6.1.3 Containment Isolation Valves (CIVs)
(In a subsequent revision to the DCD, the end states will be revised to add a requirement to proceed to Mode 5 when two CIVs are inoperable in a two-valve penetration and not isolated within the specified Completion Time.)

TS 3.6.1.4 Drywell Pressure

TS 3.6.1.5 Drywell Air Temperature

The ESBWR TS identified below, and reflected in Revision 1 of DCD Chapters 16 and 16B, presents an end state relaxation (i.e., to Mode 3) that was not addressed in TSTF-423-A. Given that Reactor Coolant System (RCS) leakage continues to be monitored to be within limits in accordance with LCO 3.4.2, RCS Operational LEAKAGE, the risk of operation in Mode 3 versus Mode 4 with inoperable RCS leakage detection system(s) is bounded by evaluations made with other more risk significant systems inoperable.

TS 3.3.4.1 Reactor Coolant System (RCS) Leakage Detection Instrumentation

The ESBWR TS identified below had proposed end state relaxations that will be eliminated in a subsequent revision to the DCD such that the end state relaxations of TSTF-423-A will not apply:

TS 3.3.6.1 Main Steam Isolation Valve (MSIV) Instrumentation
(In a subsequent revision to the DCD, the end states will be revised to reflect declaring the associated MSIV(s) inoperable.)

TS 3.3.6.2 Main Steam Isolation Valve (MSIV) Actuation
(In a subsequent revision to the DCD, the end states will be revised to reflect declaring the associated MSIV(s) inoperable.)

TS 3.3.6.3 Isolation Instrumentation
(In a subsequent revision to the DCD, the end states will be revised to reflect declaring the associated CIV(s) inoperable.)

TS 3.3.6.4 Isolation Actuation
(In a subsequent revision to the DCD, the end states will be revised to reflect declaring the associated CIV(s) inoperable.)

TS 3.4.2 RCS Operational LEAKAGE
(In a subsequent revision to the DCD, the end states will be revised by removing the brackets from the requirement to proceed to Mode 5.)

TS 3.4.4 RCS Pressure and Temperature (P/T) Limits
(In a subsequent revision to the DCD, the end states will be revised by removing the brackets from the requirement to proceed to Mode 5.)

TS 3.6.1.7 Passive Containment Cooling System (PCCS)
(In a subsequent revision to the DCD, the end states will be revised to add a requirement to proceed to Mode 5.)

TS 3.6.2.2 Suppression Pool Water Level
(In a subsequent revision to the DCD, the end states will be revised to add a requirement to proceed to Mode 5.)

TS 3.7.5 Isolation Condenser (IC)/Passive Containment Cooling (PCC) Pools
(In a subsequent revision to the DCD, the end states will be revised to add a requirement to proceed to Mode 5.)

DCD Impact

DCD Tier 2, Chapters 16 and 16B, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.2-10

Using NUREG-1434, Rev. 3.1 as guidance, explain why the phrase "into the drywell" is omitted from the definition of Identified LEAKAGE, and "pumps" is used instead of "pump seals" in the proposed ESBWR TS Definitions Section 1.1.

GE Response

The ESBWR definition of Leakage will be revised to include the phrases "into the drywell" and "pump seals" so that it will be consistent with the definition of Leakage presented in NUREG-1434, Rev. 3.1.

DCD Impact

Design Control Document (DCD) Tier 2, Section 16.1.1, "Definitions," will be revised as described above in a future revision.

NRC RAI 16.2-12

Explain difference between NUREG-1434, Rev. 3.1 STS Shutdown Margin (SDM) definition and the SDM definition in the proposed ESBWR TS Section 1.1.

GE Response

NUREG-1434, Revision 3.1, includes a definition for Shutdown Margin (SDM) in Technical Specification 1.1, as it applies to the BWR/6 design. In the ESBWR, the Control Rod Drive System (CRDS) differs from that of the BWR/6 in the design of the CRDS Hydraulic Control Units (HCUs) and other system design features, and in the design of the control rod drives. The ESBWR uses Fine Motion Control Rod Drives that can insert and withdraw the control rods using individual electric motors, and containing a hollow cylinder that hydraulically scrams the control rod using HCU accumulators that are maintained at pressures significantly higher than maximum Reactor Coolant System pressure. Except for the one FMCRD that has a single, dedicated HCU, all other FMCRDs are logically grouped in pairs, with each pair sharing a common HCU. As described in DCD Tier 2, Chapter 16B, Technical Specification Bases 3.1.1, SHUTDOWN MARGIN (SDM), adequate SDM is required to be assured with the highest worth control rod or rod pair withdrawn. This is consistent with the Shutdown Margin evaluation described in DCD Tier 2, Section 4.3.3.3.1 and Table 4.3-1 and the applicable safety analyses described in DCD Tier 2, Chapter 15. Therefore, the definition of SDM provides that SDM is required to be demonstrated assuming either a single control rod or one of the control rod pairs are fully withdrawn, whichever represents the highest amount of reactivity worth.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 or Chapter 16B as a result of this RAI.

NRC RAI 16.2-13

Provide an example in TS Section 1.3 that more clearly illustrates the use of a MODE 3 or MODE 4 end state for the ACTIONS of a Specification with Applicability to MODES 1, 2, 3, and 4, in order to state the time limitations for using such end states (as described in TSTF-423).

GE Response

ESBWR Technical Specifications (TS) Section 1.3 currently includes examples of the use of end states that are consistent with Section 1.3 of NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6," Revision 3.1, to the extent practical for the ESBWR design.

With respect to time limitations for using Mode 3 end states during the application of the relaxations reflected in TSTF-423-A, Revision 0, "Technical Specifications End States, NEDC-32988-A," the same time limitations discussed in TSTF-423 that allow relaxation of end states for the BWR/6 plants will also apply to the ESBWR plants TSTF-423-A. TSTF-423-A does not include any changes to Section 1.3 of the NUREG-1434 TS and as such, no additional Section 1.3 example describing the use of a Mode 3 end state is considered to be necessary in the ESBWR TS. However, these limitations are addressed in each applicable Bases as commitments to the implementation guidance provided in TSTF-IG-05-02, Implementation Guidance for TSTF-423, Revision 0, "Technical Specifications End States, NEDC-32988-A."

With respect to use of a Mode 4 end state, the ESBWR TS, with the exception of LCO 3.0.3, do not use Mode 4 as an end state. The LCO 3.0.3 use of Mode 4 as an end state is adequately described in the Bases for LCO 3.0.3 of the ESBWR DCD Chapter 16B. As such, no additional Section 1.3 example describing the use of a Mode 4 end state is considered necessary in the ESBWR TS.

DCD Impact

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

NRC RAI 16.2-14

In TS 2.1.1.2, the phrase "Greater than 99.9 percent of the fuel rods in the core would be expected to avoid boiling transition," is a criterion for a safety limit (SL), not a SL. The SL should be a parameter, such as MCPR, or peak C/L temperature, as provided in brackets in NUREG-1434 STS. Justify the omission of a numerical value in the proposed ESBWR TS. Explain the discrepancy between the Bases, which refer to MCPR, and TS SL 2.1.1.2.

GE Response

GE will address this concern in the response to similar questions provided in NRC RAI 15.0-16. This response will include discussion of any required Technical Specification or Technical Specification Bases changes.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 or Chapter 16B as a result of this RAI.

NRC RAI 16.2-15

Discuss how not being required to exit an LCO's applicability, when the LCO and its associated required actions are not met, affects the application and use of LCO 3.0.3, LCO 3.0.4, SR 3.0.1, and SR 3.0.4.

GE Response

The adoption of TSTF-423-A, Revision 0, "Technical Specifications End States, NEDC-32988-A," into the ESBWR Technical Specifications (TS) does create conditions where it is not required to exit the Applicability of an LCO, when an LCO and specific associated Actions are not met (i.e., termed "end state relaxation"). However, to utilize these allowances, the guidance of TSTF-IG-05-02, Implementation Guidance for TSTF-423, Revision 0, "Technical Specifications End States, NEDC-32988-A," must be followed. In a future revision to DCD Chapter 16B, as reflected in the response to NRC RAI 16.0-7, a specific commitment to implement TSTF-IG-05-02 will be added to each Bases of the associated TS for which the end state relaxations are adopted.

The use and application of LCO 3.0.3 is not affected by the end state relaxations of TSTF-423-A. In addition, the end state relaxations of TSTF-423-A do not apply to LCO 3.0.3. LCO 3.0.3 continues to require action to be taken to place the unit in a Mode or other specified condition in which the LCO is not applicable, when an LCO is not met and associated Actions are not met, when an associated Action is not provided, or if directed by the associated Actions. The determination of the non-applicable Mode or other specified condition referenced in LCO 3.0.3 is based on the Applicability of the LCO, not the end states reflected in the Actions of the affected LCO. Exceptions to LCO 3.0.3 stated in individual Specifications are unchanged as a result of the adoption of TSTF-423-A.

The use and application of LCO 3.0.4 is not affected by the end state relaxations of TSTF-423-A. The end state relaxations of TSTF-423-A appear to allow entry into a Mode or other specified condition in the Applicability with an LCO not met, in accordance with LCO 3.0.4.a, since the end state relaxation presents associated Actions as permitting continued operation in the Mode or other specified condition in the Applicability for an unlimited period of time. However, in a subsequent revision to the DCD, consistent with TSTF-423-A, the Bases of the associated Actions will indicate that the acceptability of remaining in the Applicability is to be demonstrated by compliance with the guidance of TSTF-IG-05-02. The ESBWR TS are intended to maintain implementation of Mode changes utilizing LCO 3.0.4 consistent with existing industry practice and with the guidance associated with TSTF-423-A, which has been approved by the NRC (Consolidated Line Item Improvement Process (CLIIP) Notice of Availability published in the Federal Register (71 FR 14726) on March 23, 2006).

The use and application of SR 3.0.1 is not affected by the end state relaxations of TSTF-423-A. Surveillance Requirements continue to be required to be met in the Mode or other specified conditions in the Applicability of the individual LCOs (TSTF-423-A did not change the Applicability of the individual LCOs), failure to meet a Surveillance continues to be considered to be failure to meet the LCO (TSTF-423-A did not change Surveillances), and failure to perform a Surveillance within the specified Frequency continues to be considered to be failure to meet the LCO, except as provided in SR 3.0.3 (TSTF-423-A did not change Surveillance Frequencies). In

addition, SR 3.0.1 continues to provide the allowance that Surveillances do not have to be performed in inoperable equipment or variables outside of limits.

The use and application of SR 3.0.4 is not affected by the end state relaxations of TSTF-423-A. Entry into a Mode of other specified condition in the Applicability of an LCO continues to require that LCO's Surveillances have been met within their specified Frequency, except as provided by SR 3.0.3. When an LCO is not met due to Surveillances not having been met, entry into a Mode or other specified condition continues to only be allowed in accordance with LCO 3.0.4. The impact of the end state relaxations of TSTF-423-A on LCO 3.0.4 is discussed above. In addition, the allowance that SR 3.0.4 shall not prevent Mode or other specified condition changes in the Applicability that are required to comply with Actions or that are part of a shutdown of a unit is unchanged by the adoption of TSTF-423-A.

DCD Impact

DCD Tier 2, Chapter 16B, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.2-16

DCD Tier 2, Rev.1, Chapter 16 TS LCO 3.0.3 MODE 5 Completion Time is indeterminate as currently written. Provide a modification to the LCO to clarify MODE 5 completion time as is provided for modes 2, 3, 4 in this LCO.

GE Response

LCO 3.0.3 of Revision 1 of the ESBWR Technical Specifications (TS) currently requires action to be initiated within 1 hour to place the unit in Mode 2 within 7 hours, Mode 3 within 13 hours, Mode 4 within 37 hours and to initiate action within 73 hours to place the unit in Mode 5.

LCO 3.0.3 will be revised to require action to be initiated within 1 hour to place the unit in Mode 2 within 7 hours, Mode 3 within 13 hours, Mode 4 within 25 hours, and Mode 5 within 37 hours. Thus, the Completion Time for Mode 4 will be reduced from 37 hours to 25 hours and the indeterminate Completion Time for Mode 5 will be replaced with a specific Completion Time of 37 hours. The revised times reflect the continued efforts to reach Cold Shutdown conditions within 37 hours, which is consistent with the existing LCO 3.0.3 requirements for all Standard Technical Specifications as well as the approved AP1000 Generic Technical Specifications.

DCD Impact

DCD Tier 2, Chapter 16, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.2-17

Discuss why adoption of an LCO similar to the AP1000 TS LCO 3.0.8 is not proposed for the ESBWR TS Section 3.0, when an LCO is not met and associated ACTIONS are not met, or an associated ACTION is not provided.

GE Response

The basis for the addition of LCO 3.0.8 to the AP1000 TS is discussed in Section 16.2.3 of the NRC Final Safety Evaluation Report (NUREG-1793) for the AP1000 design dated September 2004. Section 16.2.3 of NUREG-1793 states that LCO 3.0.8 was added to the AP1000 TS to specify appropriate remedial actions in the event that an applicable shutdown LCO, and associated action requirements, cannot be met in Modes 5 and 6 and that the addition of LCO 3.0.8 is a consequence of the AP1000 TS containing LCOs applicable during shutdown conditions that are in addition to those in the Standard Technical Specifications for Westinghouse Plants (i.e., NUREG-1431).

The ESBWR Technical Specifications (TS) were modeled after the NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6," Revision 3.1. The ESBWR TS did not include LCOs applicable during "shutdown conditions" (i.e., Modes or conditions in which LCO 3.0.3 is not applicable) that were in addition to those found in NUREG-1434. As such, the basis stated in Section 16.2.3 of NUREG-1793 for adding LCO 3.0.8 does not apply to the ESBWR TS.

Furthermore, a review of all ESBWR TS applicable in "shutdown conditions" concluded that all possible conditions reflecting failure to meet the LCO were adequately addressed by the proposed Required Actions.

Finally, the AP1000 LCO 3.0.8 contains two requirements.

- First, LCO 3.0.8.a requires actions to be initiated to "Restore inoperable equipment."

  A review of all ESBWR TS applicable in "shutdown conditions" concluded that the associated Actions either explicitly included requirements to restore compliance with the LCO or implicitly included requirements to restore compliance with the LCO as a result of LCO 3.0.2 (i.e., completion of the Required Actions continues to be required when an LCO is not met). As such, LCO 3.0.2 requirements are adequate to address the intent of AP1000 LCO 3.0.8.a in the current proposed ESBWR TS.

- Second AP1000 LCO 3.0.8.b requires actions to be initiated to "Monitor Safety System Shutdown Monitoring Trees parameters."

  10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," paragraph (a)(4) requires assessing and managing increase in risk that may result from maintenance (including corrective maintenance) activities. These requirements are applicable during all conditions of plant operation (including normal shutdown operations). As such, requirements similar to the AP1000 LCO 3.0.8.b actions are adequately addressed by the requirements of 10 CFR 50.65(a)(4) without including a new Technical Specification requirement.

DCD Impact

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

NRC RAI 16.2-18

Using NUREG-1434, Rev. 3.1 as guidance, ESBWR TS 3.1.1 is missing the Required Actions (RA) D.4 and E.5. The RA to "Initiate action to restore [the reactor building] to OPERABLE status," is not sufficient when compared to NUREG-1434. NUREG-1434 TS 3.1.1 has the action to "restore isolation capability in each required reactor building penetration flow path not isolated (assuming there are reactor building isolation valves required to be closed to support maintaining reactor building ex-filtration rate is within limits) to Operable status." Provide justification for omitting this requirement from the ESBWR TS.

GE Response

The proposed Design Control Document (DCD) Tier 2, Chapter 16, Technical Specification (TS) 3.1.1 is consistent with the intent of NUREG-1434, Revision 3.1.

NUREG-1434 TS 3.1.1, Shutdown Margin (SDM), Required Actions D.2 and E.3 require initiation of action to restore secondary containment to OPERABLE status, and Required Actions D.4 and E.5 require initiation of action to restore isolation capability in each required secondary containment penetration flow path not isolated. NUREG-1434 also provides separate TS requirements for Secondary Containment in TS 3.6.4.1 associated with TS 3.1.1 Required Actions D.2 and E.3, and for Secondary Containment Isolation Valves (SCIVs) in TS 3.6.4.2 associated with TS 3.1.1 Required Actions D.4 and E.5. In contrast, ESBWR TS 3.1.1, Shutdown Margin (SDM), Required Actions D.2 and E.3 require initiation of action to restore Reactor Building to OPERABLE status, and there are no equivalent requirements to NUREG-1434 TS 3.1.1 Required Actions D.4 and E.5. This is because ESBWR TS 3.6.3.1, Reactor Building, includes the Reactor Building and Reactor Building boundary isolation dampers in a single Technical Specification (i.e., combines the ESBWR requirements into one TS (TS 3.6.3.1) comparable to the two, separate TS in NUREG-1434 (TS 3.6.4.1 and 3.6.4.2). Therefore, all of the cited TS 3.1.1 Required Actions in NUREG-1434, Revision 3.1, are encompassed by ESBWR TS 3.1.1 Required Actions D.2 and E.3.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 or Chapter 16B as a result of this RAI.

NRC RAI 16.2-19

DCD Tier 2, Rev. 1,Chapter 16, TS 3.1.3 RA A.3 Completion Time states: "24 hours from each discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint." Since only one rod is permitted to be stuck, justify using the condition "each" in the TS. If it is an editorial mistype, remove the word "each" from the COMPLETION TIME.

GE Response

The use of the word "each" was unintentional. Therefore, DCD Tier 2, Chapter 16, Technical Specification 3.1.3 Required Action A.3 Completion Time will be revised in a future revision of DCD Chapter 16 to state "24 hours from discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint (LPSP)."

DCD Impact

DCD Tier 2, Chapter 16, Technical Specification 3.1.3 Required Action A.3 Completion Time will be revised in a future revision of DCD Chapter 16 to state "24 hours from discovery of Condition A concurrent with THERMAL POWER greater than the low power setpoint (LPSP)."

NRC RAI 16.2-20

Explain and justify the DCD Tier 2, Rev. 1, Chapter 16, SR 3.1.3.2 and SR 3.1.3.3 requirements to move control rods 2 notches versus 1 notch in NUREG-1434.

GE Response

NUREG-1434, Revision 3.1, includes requirements for verifying control rods are not stuck by insertion of each control rod for a distance of at least 1 notch, as it applies to the BWR/6 design. As described in Design Control Document (DCD) Tier 2, Section 7.7.2.2.7, the ESBWR fine motion control rod drives (FMCRDs) can be moved in steps (i.e., movements of 36.5 mm nominal distance for each step movement activated except for the last withdrawal or for the first step movement from normal full-out position, which has a nominal step distance of 37.5 mm), or notches (i.e., movement to the next rod position that is an integer multiple of 2 steps movement from being fully- inserted). Because 2 notches for an FMCRD is approximately the same distance as 1 notch for the typical BWR/6 control rod drive, and that insertion by at least 2 notches is compatible with the requirements of the Ganged Withdrawal Sequence Restrictions (Technical Specification 3.1.6) and the Rod Control & Information System (Technical Specification 3.3.2.1), the 2 notch requirement is acceptable.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 or Chapter 16B as a result of this RAI.

NRC RAI 16.2-21

DCD Tier 2, Rev. 1, Chapter 16, TS 3.1.4 SR Note and Bases are not consistent in that the SR Note refers to rod "pair" and the Bases do not. Explain the SR Note in the Bases.

GE Response

The omission of the term "control rod pair" was unintentional. Therefore, Design Control Document (DCD) Tier 2, Chapter 16B, Technical Specification Bases 3.1.4, Control Rod Drive Scram Times, Surveillance Requirement (SR) Note will be revised in a future revision of DCD Chapter 16B to state "All four SRs of this LCO are modified by a Note stating that during a single control rod **or control rod pair** scram time Surveillance, the CRD pumps shall be isolated from the associated scram accumulator. With the CRD pump isolated (i.e., charging valve closed) the influence of the CRD pump head does not affect the single control rod **or control rod pair** scram times. During a full core scram, the CRD pump head would be seen by all control rods and would have a negligible effect on the scram insertion times."

DCD Impact

DCD Tier 2, Chapter 16B, Technical Specification Bases 3.1.4, Control Rod Drive Scram Times, Surveillance Requirement (SR) Note will be revised as described above in a future revision

NRC RAI 16.2-22

DCD Tier 2, Rev. 1, Chapter 16, Table 3.1.4-1 Note c) refers to "only the [60] percent insertion time limit applies," and is not explained in Bases. Provide explanation of this statement in the Bases.

GE Response

NUREG-1434, Revision 3.1, Technical Specification (TS) Table 3.1.4-1, Control Rod Scram Times, does not contain an insertion time limit when performing control rod scram tests at 0 psig, and does not contain a similar note to Design Control Document (DCD) Tier 2, Chapter 16, TS Table 3.1.4-1, Note (c). This insertion time limit at 0 psig is not necessary for the ESBWR. Therefore, ESBWR TS Table 3.1.4-1, Control Rod Scram Times, and the associated TS 3.1.4 Bases, will be revised in a future revision of DCD Chapters 16 and 16B to more closely align with the requirements of NUREG-1434, Revision 3.1. These changes will result in eliminating the 0 MPaG (0 psig) column and Note (c) from TS Table 3.1.4-1.

DCD Impact

DCD Tier 2, Chapters 16 and 16B, TS Table 3.1.4-1, Control Rod Scram Times, and the associated TS 3.1.4 Bases, will be revised as described above in a future revision.

NRC RAI 16.2-25

Revise the DCD Tier 2, Rev. 1, Chapter 16, Instrumentation TS to adopt the approved version of TSTF-493 including resolution to staff issues with Limiting Safety System Settings (LSSS) during periodic testing and calibration of instrument channels.

GE Response

GE will address incorporation of TSTF-493, "Clarify Application of Setpoint Methodology for LSSS Functions," including resolution to staff issues with LSSS during periodic testing and calibration of instrument channels, to the extent practical based on the ESBWR design and setpoint calculation methodology, in a future revision of Design Control Document (DCD) Chapter 16, following approval of TSTF-493 by the NRC.

DCD Impact

DCD Tier 2, Chapters 16 and 16B, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.2-31

DCD Tier 2, Rev. 1, Chapter 16, TS 3.5.1 states, "...Safety Relief Valves (SRVs)..." and DCD, Tier 2, Rev. 1 Section 6.3.1.2 states "... safety/relief valves (SRVs)..." Clarify the term SRV to be consistent.

GE Response

GE will revise DCD Tier 2, Section 6.3.1.2 to replace "safety/relief valves (SRVs)" with "safety relief valves (SRVs)" in a future revision of DCD Tier 2, Chapter 6.

DCD Impact

DCD Tier 2, Section 6.3.1.2 will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.2-32

Limiting conditions for operation (LCOs) are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met (10 CFR 50.36(c)(2)).

The Automatic Depressurization System (ADS) is an integral part of the ECCS because Gravity Driven Control System (GDCS) flow to the reactor pressure vessel (RPV) requires the RPV to be close to containment pressure (B 3.5.1 Automatic Depressurization System (ADS) - Operating). Currently, TS 3.5.1 ACTIONS require a shutdown if three or more ADS SRVs are inoperable OR three or more (depressurization valves) DPVs are inoperable, but would permit continued operation for up to two weeks if two ADS SRVs and two DPV (four valves total) were inoperable.

Provide the LCO or Action that addresses combinations of degraded ADS SRV, DPV and GDCS, or justify not having combinations. For guidance, note that NUREG-1434 STS address combinations of ADS and low pressure systems being inoperable. For example, STS LCO 3.5.1 says: "One ADS valve inoperable AND One low pressure ECCS injection/spray subsystem inoperable."

GE Response

Design Control Document (DCD) Tier 2, Rev. 1, Chapter 16, LCO 3.5.1, "Automatic Depressurization System (ADS) – Operating," requires the operability of ten ADS Safety Relief Valves (SRVs) and eight Depressurization Valves (DPVs). DCD Tier 2, Rev. 1, Chapter 16, LCO 3.5.2, "Gravity-Driven Cooling System (GDCS) – Operating," requires the operability of eight GDCS injection branch lines and four trains of the GDCS equalizing subsystem. Conditions, Required Actions, and Completion Times for LCOs 3.5.1 and 3.5.2 are written based on an assumption that pending analyses will demonstrate that the ECCS safety function is maintained with the simultaneous failure of two ADS SRVs, two DPVs, two GDCS injection branch lines, and two trains of the GDCS equalizing subsystem.

Conditions, Required Actions, and Completion Times for LCOs 3.5.1 and 3.5.2 will remain enclosed in brackets, indicating that additional analysis or justification is required prior to approval, until the DCD changes that provide the required justification are approved.

DCD Impact

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

NRC RAI 16.2-34

LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. (10 CFR 50.36(c)(2))

The SRVs are capable of being actuated in one or both of two modes: the safety mode and the Automatic Depressurization System (ADS) power actuated mode. There are 18 SRVs, of which 10 have ADS functions and 8 do not.

LCO 3.4.1 Actions permit up to 15 inoperable SRVs (of 18) for 14 days (for the safety function).

LCO 3.5.1 Actions permit 2 (of 10) inop ADS SRV or 2 (of 8) DPV to be inoperable for 14 days (for the safety function)

This means the proposed TS would allow, for two weeks, 8/8 non-ADS SRVs inoperable for safety function purposes, 7/10 ADS SRVs inoperable for safety function purposes, and 2/3 of the remaining ADS SRVs inoperable for ADS purposes with just 1/18 SRV/ADS SRV fully functional.

Justify the 14-day COMPLETION TIME for repair given the above scenario.

GE Response

The ESBWR is similar to the BWR/6 in that the Safety Relief Valves (SRVs) perform three functions: 1) ASME Boiler & Pressure Vessel Code, Section III overpressure protection; 2) the automatic depressurization system (ADS) in support of the emergency core cooling system (ECCS); and, 3) Anticipated Transients without Scram (ATWS) overpressure protection.

The Standard Technical Specifications (STS) for the BWR\6, NUREG-1434, Revision 3.1, establish requirements for the ASME overpressure protection and the ADS functions only. ATWS overpressure protection requirements are addressed by plant configuration management and corrective action programs. This approach is appropriate because the SRV capacity assumed for ATWS overpressure protection is required only if multiple reactor protection scram functions fail following the inadvertent closure of main steam isolation valves in all four steam lines. Therefore, as described later in this response, GE will revise the ESBWR Technical Specifications to be consistent with the BWR/6 STS so that Design Control Document (DCD) Tier 2, Revision 1, Chapter 16, Technical Specification (TS) 3.4.1, "Safety Relief Valves (SRVs)." establishes requirements for ASME overpressure protection with SRV functionality requirements for ATWS addressed by plant configuration management and corrective action programs.

In order to perform all three SRV functions (ASME, ADS and ATWS), the ESBWR is equipped with eighteen spring loaded SRVs that are designed and constructed in accordance with ASME Code, Section III, NB 7640, as safety valves that may be equipped with auxiliary actuating devices. Ten of the eighteen ESBWR SRVs are equipped with pneumatic auxiliary actuating devices and these valves are designated as the ADS SRVs. In accordance with ASME code requirements, the spring lift mode SRV function is not compromised by a malfunction of the auxiliary actuating device. Therefore, as described in Tier 2, DCD 5.2.2.2 and clarified in the response to RAI 5.2-11 (MFN 06-178, dated June 16, 2006), the ADS SRVs, which are equipped

with auxiliary actuators, can also be credited for performing the ASME overpressure and ATWS overpressure functions.

As described in Tier 2, DCD 5.2.2 and clarified in the response to RAIs 5.2-17 and 5.2-27 (MFN 06-178, dated June 16, 2006), ASME overpressure protection requirements are satisfied with three or fewer SRVs operating in spring relief mode. GE will revise ESBWR LCO 3.4.1, "Safety Relief Valves (SRVs)," to require Operability of four SRVs. Associated Required Actions will allow 14 days for restoration if one of the required SRVs is inoperable and require that the reactor be in Mode 3 within 12 hours and Mode 5 within 36 hours if more than one required SRV is not Operable and ASME overpressure requirements may not be met. LCO 3.4.1 Bases will clarify that any four of the eighteen SRVs operating in spring relief mode may be used to satisfy the ASME overpressure protection requirements.

SRV functionality requirements for ATWS will be addressed by plant configuration management and corrective action programs. This approach is conservative compared to the requirements for the SRVs in the BWR6 STS because no credit is taken for the ESBWR's Isolation Condenser System (ICS) that is designed to maintain RPV pressure below the SRV lift setpoints following main steam isolation valve closure even if only three of the four ICS loops function as required. The response to RAI 5.2-19 (MFN 06-178, dated June 16, 2006) explains why ESBWR design does not include the automatic power-actuated pressure relief function which is incorporated into the BWR STS requirements for SRVs.

As described in Tier 2, DCD 5.2.2 and the Bases for LCO 3.5.1, ten of the eighteen SRVs are equipped with auxiliary actuating devices allowing them to function as both auxiliary operated ADS valves and spring lift SRVs. As noted earlier, ASME code requirements ensure that the spring lift mode SRV function is not compromised by a malfunction of the auxiliary actuating device. The ESBWR Technical Specifications establish requirements for the dual function ADS/SRV valves consistent with the approach used in the BWR6 STS. As noted in the response to RAI 16.2-32, Conditions, Required Actions, and Completion Times for inoperable ADS valves in LCO 3.5.1 will remain enclosed in brackets, indicating that additional analysis or justification is required prior to approval, until the DCD changes that provide the required justification are approved.

DCD Impact

DCD Tier 2, Chapter 16, LCO 3.4.1, "Safety Relief Valves (SRVs)," and the associated Bases will be revised as described above in a future revision.

NRC RAI 16.2-35

DCD, Tier 2, Rev. 1, section 6.3.2.8.4 states, "during plant operation, periodic tests and inspections are required as indicated in the plant specific Technical Specifications." Proposed ESBWR TS SR 3.5.1 excludes squib actuation during testing of DPV. Basis SR 3.5.1.5 has a bracketed statement that the OPERABILITY of squib-actuated valves is verified by the Inservice Test Program for squib-actuated valves. TS 5.5.5 Inservice Testing Program requires testing in accordance with ASME code. Should brackets be removed? If TS 5.5.5 is not sufficient to assure squib testing, describe how functionality of squib explosive charges is assured during plant operation.

GE Response

Squib actuated valves in the Standby Liquid Control System (SLC), Automatic Depressurization System (ADS), and Gravity Driven Cooling System (GDCS) are subject to the requirements of 10 CFR 50.55a, Codes and Standards. 10 CFR 50.55a requires that these squib valves be subject to an Inservice Testing Program that is performed in accordance with the latest approved version of "ASME/ANSI, Operations and Maintenance Standards, Part 10 (OM-10), "Inservice Testing of Valves in Light-Water Reactor Power Plants." Tier 2, DCD Table 3.9-8, In-Service Testing, provides details for implementation of the Inservice Testing Program for the squib valves in each system.

The Inservice Test Program, in conjunction with Technical Specification surveillance requirements to verify continuity of each squib valve firing circuit every 31 days, will ensure that the squib actuated valves will function as required.

DCD Impact

Design Control Document (DCD) Tier 2, Section 16B, will be revised in a future revision to remove the brackets in the Bases around the Inservice Test Program for Surveillance Requirements 3.5.1.5 and SR 3.5.2.4.

NRC RAI 16.2-36

10 CFR 50.36(c)(3) states that TS will include items surveillance requirements (SRs), which are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.

By contrast, SR 3.5.3.1 (GDCS - Shutdown) requires that "combined water volume of required GDCS pools" be verified every 24 hours. Bases for SR 3.5.3.1 state "This SR requires verification every 24 hours that the water level in each of the GDCS pools is greater than or equal to the specified limit"

Justify why the "specified limit" on "water level" discussed in Bases for 3.5.3.1 is different from the "combined water volume" acceptance criterion in SR 3.5.3.1.

GE Response

Design Control Document (DCD) Tier 2, Revision 1, Chapter 16B, Surveillance Requirement (SR) 3.5.3.1, Bases will be revised to replace the phrase "water level" with "combined water volume" so that the Bases is consistent with the SR. The Bases for SR 3.5.3.1 will be revised to provide the following clarification:

> This SR requires verification every 24 hours that the combined water volume in GDCS pools associated with Operable GDCS injection branch lines is greater than or equal to the specified limit.

DCD Impact

DCD Tier 2, Chapter 16 B, LCO 3.5.3 Bases, will be revised as described above in a future revision.

NRC RAI 16.2-37

DCD Tier 2, Rev. 1, Chapter 16, TS SR 3.5.2.1 (GDCS - Operating) requires that each GDCS pool level be verified every 12 hours. Bases for SR 3.5.2.1 discuss pool level.

DCD Tier 2, Rev. 1, Chapter 16, TS SR 3.5.3.1 (GDCS - Shutdown) requires that "combined water volume of required GDCS pools" be verified every 24 hours.

Justify different parameters (level and volume) being used in acceptance criteria in SR 3.5.2.1 and SR 3.5.3.1.

GE Response

Design Control Document (DCD) Tier 2, Rev. 1, Chapter 16, LCO 3.5.2, "Gravity-Driven Cooling System (GDCS) – Operating," requires that the level in each of the three GDCS pools is maintained above the level specified in Surveillance Requirement (SR) 3.5.2.1 to ensure that the GDCS pools contain the volume of water assumed in the accident analyses for Modes 1, 2, 3 or 4. GDCS pool level is used as a proxy for GDCS pool volume to simplify monitoring requirements.

DCD Tier 2, Rev. 1, Chapter 16, LCO 3.5.3, "Gravity-Driven Cooling System (GDCS) – Shutdown," requires that the combined water volume of the required GDCS pools is greater than or equal to the volume specified in SR 3.5.3.1. The ESBWR has one large and two small GDCS pools. The minimum volume specified in SR 3.5.3.1 is equal to the volume of the two smaller GDCS pools when each is filled to the normal operating level. This volume was selected to allow SR 3.5.3.1 to be met with any one of the three pools drained for maintenance or inspection. As clarified in the response to RAI 16.2-36, SR 3.5.3.1 is met whenever the combined water volume in GDCS pools associated with Operable GDCS injection subsystems is greater than or equal to the specified limit.

DCD Impact

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

NRC RAI 16.2-38

10 CFR 50.36(c)(2)(ii)(c) states that a TS LCO of a nuclear reactor must be established for each structure, system, or component that is part of the primary success path, and which functions or actuates to mitigate a design basis accident, or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

DCD Tier 2, Rev. 1, Chapter 16, TS Basis 3.5.2 states "Three GDCS pools ... contain the water that supports all four GDCS trains for the injection and deluge subsystems."

Justify the exclusion of LCOs for GDCS pool operability (e.g., "Three GDSC pools shall be OPERABLE.") Provide appropriate description of OPERABLE pool (e.g., their air space connected to the drywell, no debris in pool, water chemistry correct, no peeling paint on pool walls).

GE Response

LCO 3.5.2, "Gravity-Driven Cooling System (GDCS) – Operating," requires that eight branch lines of the injection subsystem are operable. The LCO section of the Bases for LCO 3.5.2 specifies that "OPERABILITY of each GDCS subsystem requires that the water level in each of the GDCS pools is within the limit specified by SR 3.5.2.1." To clarify that GDCS pool level is a required element for the operability of the associated GDCS injection branch lines, GE will revise the LCO section of the Bases for LCO 3.5.2 as follows:

> OPERABILITY of each GDCS injection branch line requires that the water level in the associated GDCS pool be within the limit specified by SR 3.5.2.1.

Technical Specifications do not include requirements for periodic verification of the opening between the GDCS pool airspace and the DW because there is no mechanism for isolating this connection. Other attributes of Operability are adequately addressed by the ESBWR TS definition of Operable-Operability and licensee controls. Additionally, as described in Tier 2, DCD Sections 6.1.2.1, Protective Coatings, and DCD 6.1.3.1 Protective Coatings and Organic Materials, coatings used in the drywell, including GDCS pools walls will be controlled consistent with the intended application. As with currently licensed plants, cleanliness controls consistent with Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants" are intended to prevent debris that could prevent Emergency Core Cooling Systems from performing their safety function, from entering the GDCS pools. Again, as with the currently licensed plants, ECCS water chemistry is not included in Technical Specifications because the chemistry of the water used by the ECCS does not meet any criteria in 10 CFR 50.36.

DCD Impact

Design Control Document (DCD) Tier 2, Section 16B, will be revised as described above in a future revision.

NRC RAI 16.2-39

DCD Tier 2, Rev. 1, Chapter 16, SR 3.5.3.1 states "...volume of required GDCS pools...." Explain how "required" number of GDCS pools is determined or adopt LCO into Pool Operability, which will specify a number.

GE Response

GE will clarify the requirements by revising Design Control Document (DCD) Tier 2, Rev. 1, Chapter 16, LCO 3.5.3, "Gravity-Driven Cooling System (GDCS) – Shutdown," as follows:

> [Four] branch lines of the GDCS injection subsystem capable of injecting a combined volume ≥ [888 m^3 (31,367) ft^3)] from the associated GDCS pools shall be OPERABLE.

GE will clarify the requirements by revising Surveillance Requirement (SR) 3.5.3.1 as follows:

> Verify combined water volume in GDCS pools associated with OPERABLE injection branch lines is ≥ [888 m^3 (31,367) ft^3)].

In conjunction with these changes and changes described in response to RAI 16.2-36, the Bases for SR 3.5.3.1 will be revised to include the following:

> This SR requires verification every 24 hours that the combined water volume in GDCS pools associated with Operable GDCS injection branch lines is greater than or equal to the specified limit.

DCD Impact

DCD Tier 2, Chapters 16 and 16B, LCO 3.5.3, "Gravity-Driven Cooling System (GDCS) - Shutdown," will be revised as described above in a future revision.

NRC RAI 16.2-40

Justify not having temperature limits for TS 3.5.3 GDCS pools or incorporate into Pool Operability LCO if needed.

GE Response

As described in the response to NRC RAI 6.2-68, the ESBWR accident analyses for peak containment pressure assume that the initial GDCS water and gas space temperatures are in equilibrium with the drywell air temperature. These analyses were performed assuming an initial temperature of 115°F for both the drywell gases and the GDCS pool water.

When in Modes 1, 2, 3 or 4, LCO 3.6.1.5, "Drywell Air Temperature," ensures that drywell air temperature is maintained ≤ 46.1°C (115°F). The limit for drywell air temperature limits GDCS pool temperature because there is no mechanism during that could cause GDCS pool temperature to rise above drywell air temperature. Therefore, LCO 3.5.2, "Gravity-Driven Cooling System (GDCS) – Operating," does not include an explicit limit for GDCS pool water temperature when in Modes 1, 2, 3 or 4.

When in Modes 5 or 6, Technical Specifications do not provide a limit for either drywell air temperature or GDCS pool temperature. This is acceptable because the reactor is shutdown and reactor coolant system temperature is < 200°F, which significantly reduces the probability and consequences of an accident. LCO 3.5.3, "Gravity-Driven Cooling System (GDCS) – Shutdown," does not include an explicit limit for GDCS pool water temperature because the limit for GDCS pool temperature is intended to limit peak containment pressure and the containment is not required to be Operable in Modes 5 and 6.

The General Electric response to RAI 6.2-68 was submitted in Letter MFN 06-215, "Response to Portion of NRC Request for Additional Information Letter No. 33 Related to ESBWR Design Control Application – Engineered Safety Features – RAI Numbers 6.2-48 through 6.2-51,

6.2-53 through 6.2-57, and 6.2-64 through 6.2-74," dated July 12, 2006.

DCD Impact

No Design Control Document (DCD) changes will be made in response to this RAI.

NRC RAI 16.2-43

Why is Mode 3 the end state for the proposed ESBWR TS 3.6 when the Applicability includes Modes 1, 2, 3, and 4 (applies to TS 3.6.1.1, 3.6.1.2, 3.6.1.3, 3.6.1.4, 3.6.1.5, 3.6.1.6, 3.6.1.7, 3.6.2.2)?

GE Response

The basis for applying Mode 3 end states for the ESBWR Technical Specifications (TS) listed in the above NRC RAI is provided in the response to NRC RAI 16.0-7.

DCD Impact

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

NRC RAI 16.2-44

Why is the Note provided in NUREG-1434 Rev.3, TS 3.6.1.2, Required Actions A.3 & B.3 omitted in the proposed ESBWR TS?

GE Response

NUREG-1434 Rev.3, TS 3.6.1.2, Required Actions A.3 and B.3 contain notes stating that airlock doors in high radiation areas may be verified locked closed by administrative means. GE will revise DCD Chapter 16, TS 3.6.1.2, Required Actions A.3 and B.3 to include the NUREG-1434 note addressing airlock doors in high radiation areas. GE will also revise the Bases for TS 3.6.1.2, Required Actions A.3 and B.3 to describe the purpose of the notes, consistent with NUREG-1434, Revision 3.1.

DCD Impact

DCD Tier 2, Chapter 16 will be revised as described above in a future revision.

NRC RAI 16.2-46

Reactor water cleanup (RWCU)/shutdown cooling (SDC) drywell spray flow limit should be verified with a periodic test - as it will likely be determined by a throttle valve, as a condition of containment operability. See DCD, Tier 2, Rev. 1, page 6.2-14. Discuss how this flow limit will be ensured if not by a TS surveillance.

GE Response

Drywell spray flow is provided by the Fuel and Auxiliary Pools Cooling System (FAPCS), as described in Design Control Document (DCD) Tier 2, Section 9.1.3. The containment negative pressure analysis, provided in DCD Tier 2, Subsection 6.2.1.1.4, Revision 1, states that the drywell spray flow rate must be less than 227 m3/hr (1000 gpm) in order to prevent excessive negative pressure in the event that the drywell sprays are inadvertently actuated during normal operation or during the post-LOCA recovery period. Subsection 6.2.1.1.4, Revision 1, also requires this flow rate to be confirmed by the Combined Operating License Applicant.

GE will revise DCD Tier 2, Subsection 9.1.3.2 (7th paragraph under "Detailed System Description") as follows:

> "A drywell spray discharge line and a ring header with spray nozzles mounted on the header are provided for spraying water inside the drywell to reduce the drywell pressure 72 hours following a LOCA to assist in post accident recovery. The drywell spray flow rate is maintained below a maximum value by a flow restricting orifice to avoid excess negative pressure in the drywell as described in section 6.2.1.1.4. The ring header equipped with spray nozzles is located in the drywell."

These revisions will be provided in a future update of DCD Tier 2, Chapter 9.

DCD Impact

DCD Tier 2, Subsection 9.1.3.2 will be revised in a future update as noted in the above discussion.

NRC RAI 16.2-47

DCD Tier 2, Rev. 1, section 6.2.1.1.5.3.2, "Vacuum Valve Operability Tests," states that the SRP specifies Operability monthly testing of vacuum valves (but that improvements in design make it acceptable to specify refueling-cycle intervals to test for free movement of each vacuum breaker.) Provide justification for extending the surveillance time to 24 months.

GE Response

Design Control Document (DCD) Tier 2, Subsection 6.2.1.1.5.3.2 provides the following information concerning testing of the ESBWR vacuum breakers: "Operability tests are conducted at plants of earlier BWR designs using an air actuated cylinder attached to the valve disk. The air actuated cylinders have been found to be one of the root causes of vacuum breakers failing to close. Free movement of the vacuum breakers in the ESBWR design has been enhanced by eliminating this potential actuator failure mode, improving the valve hinge design and selecting materials which are resistant to wear and galling. Therefore, this requirement for monthly testing is deemed unnecessary for the ESBWR. However, the vacuum breakers will be tested for free movement during each outage." GE provided additional information related to vacuum breaker reliability studies in the response to RAI 3.9-1 provided to the NRC by GE letter MFN 06-127, dated June 16, 2006.

As stated in DCD Tier 2, Subsection 6.2.1.1.5.3.2, the ESBWR vacuum breakers are not equipped with an air actuated cylinder. Testing for freedom of movement requires access to the vacuum breakers; therefore, this Surveillance Requirement can only be performed with the plant in a shutdown condition. In addition to the changes in vacuum breaker configuration discussed in DCD Subsection 6.2.1.1.5.3.2, the reliability studies referenced by MFN 06-127 showed the ESBWR vacuum breakers to be highly reliable. Therefore, GE has determined that a 24-month Frequency is appropriate.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 as a result of this RAI.

NRC RAI 16.2-48

Justify not including NUREG-1433 SR 3.6.1.8.3, "Verify opening setpoint of each required vacuum breaker is ≤[0.5] psid, in proposed ESBWR TS 3.6.1.6.

GE Response

Design Control Document (DCD) Tier 2, Subsection 6.2.1.1.2 describes the vacuum breakers as "self-actuating valves, similar to check valves." Use of the term "setpoint" could imply an automatic, instrumented opening mechanism. Because the vacuum breakers are self-actuating, a more appropriate requirement would be a verification of the force required to open the vacuum breaker. GE will revise DCD Tier 2, Chapter 16, TS 3.6.1.6 to include a verification of the opening force as a Surveillance Requirement in a future update of DCD Tier 2, Chapter 16.

DCD Impact

DCD Tier 2, Chapter 16 will be revised as described above in a future revision.

NRC RAI 16.2-49

DCD, Tier 2, Rev. 1, Page 6.2-9 mentions butterfly and solenoid valves for the vacuum breakers. Why are the butterfly valves and their solenoid valves not required to be tested by a surveillance requirement as part of TS 3.6.1.6?

GE Response

The response to RAI 16.0-1 provided in GE letter MFN 06-263, dated August 8, 2006, provided a commitment, on page 2 of Enclosure 1, to include drywell to wetwell vacuum breaker proximity switch and downstream isolation valve testing in the TS; stating "...the Drywell (DW) to Wetwell (WW) vacuum breaker line isolation valves, and the associated actuation instrumentation for the DW to WW vacuum breaker line isolation valves including the proximity switches on the DW to WW vacuum breaker valves, have been determined to meet 10 CFR 50.36(c)(2)(ii) Criterion 3 and will therefore result in a revision to Technical Specifications to include a new SR to ensure periodic verification of the appropriate containment or ECCS related Technical Specification function." Because GE has previously committed to including these components in the Design Control Document (DCD) Tier 2, Chapter 16 TS, no additional changes will be made to DCD Tier 2, Chapter 16 as a result of this RAI.

DCD Impact

DCD Tier 2, Chapter 16 will be revised as described above in a future revision.

NRC RAI 16.2-51

Justify excluding the 24 month Frequency Surveillance Requirement to verify the Emergency Breathing Air System air supply valves actuate on an actual or simulated signal in TS Section 3.7.1.

GE Response

This requirement is addressed in Design Control Document (DCD) Tier 2, Chapter 16, Technical Specification (TS) Surveillance Requirement (SR) 3.7.1.3. Currently, SR 3.7.1.3 requires verifying that "CRHA (Control Room Habitability Area) isolation dampers and EBAS (Emergency Breathing Air System) automatic valves actuate on an actual or simulated isolation signal" on a 24 month frequency. However, the corresponding SR 3.7.1.3 Bases more properly indicate actuation on an "actuation" signal. Therefore, SR 3.7.1.3 will be clarified in a future revision of DCD Chapter 16 to state "Verify CRHA isolation dampers isolate and EBAS automatic valves actuate on an actual or simulated actuation signal" on a 24 month frequency.

DCD Impact

DCD Tier 2, Chapter 16, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.2-53

DCD Tier 2, Rev. 1, Chapter 16, TS 3.7.3, states that one complete cycle of each main turbine bypass valve shall be performed once every 92 days. The basis for this interval states that the frequency is based on engineering judgement. However, the frequency for turbine bypass valve cycling presented in NUREG-1434, Rev. 3, is 31 days, also based on engineering judgement.

Describe the basis for the extension of the turbine bypass valve cycling interval from 31 to 92 days, including the extent operating experience supports the extension and the extent the operating experience is applicable to the ESBWR turbine bypass system. Justify extending the frequency of SR 3.7.3.1 from 31 days stated in NUREG-1434, to 92 days in the ESBWR proposed TS.

GE Response

GE is currently evaluating suppliers for the turbine bypass valves, and anticipates that the manufacturer's acceptance testing will verify the reliability of the turbine bypass valves is sufficient to justify a 92 day surveillance frequency. However, it may be possible that the initial ESBWR units are constructed before sufficient manufacturer testing is performed and evaluated, or before sufficient industry operating experience occurs for the specific valve model, to justify 92 days. Therefore, GE proposes to maintain the bracketed value of 92 days in Design Control Document (DCD) Tier 2, Chapter 16, Technical Specification (TS) Surveillance Requirement (SR) 3.7.3.1 until justification can be provided to the NRC for review. In the meantime, a Reviewer's Note will be added to the SR 3.7.3.1 Bases in a future revision of DCD Chapter 16B to state that 31 days should be specified unless justification is provided for the 92 day frequency.

DCD Impact

DCD Tier 2, Chapter 16, will be revised in a subsequent revision to the DCD as noted in the above discussion.

NRC RAI 16.2-55

Float current monitoring was proposed to be used as a method of verifying the battery's state-of-charge in lieu of specific gravity monitoring. Specific gravity monitoring is used to measure the strength of a battery cell's electrolyte, which is an important component of the battery's chemical reaction, and provides a direct indication of the battery's state-of-charge. Whereas, float current monitoring may or may not provide an accurate indication of the battery's state-of-charge. Float current monitoring is based on a calculation that is dependent on several variables. The staff has a concern with two variables of this calculation: the applied charging voltage and cell resistance. A change in either of these variables may provide a false indication of the battery's state-of-charge.

Provide assurance that float current monitoring will provide an accurate indication of the battery's state-of charge (during a battery recharge as well as steady-state operations) (LCO 3.8.1 Required Action A.2, LCO 3.8.2 Required Action A.2, LCO 3.8.4 CONDITION B, LCO 3.8.4 CONDITION F, SR 3.8.4.1).

GE Response

The NRC letter to the Technical Specification Task Force, dated April 11, 2006, "Request for Public Meeting to Discuss Enclosed Document *Electrical Engineering Branch Concerns with Technical Specification Task Force (TSTF)-360, Revision 1 DC Electrical Rewrite,*" (ML061020636 and ML061100185) identifies the same issue as this RAI in "Staff Concern 2." TSTF-360 has already been incorporated into the BWR/6 Standard Technical Specifications (STS), NUREG-1434, Revision 3.1, and industry efforts to resolve this issue are ongoing.

The ESBWR Design Control Document (DCD) Chapter 16 Technical Specifications are based on the BWR/6 Standard Technical Specifications, NUREG-1434. It is GE's intent to maintain consistency with the latest approved Standard Technical Specifications to the extent practicable and applicable to the ESBWR design. Upon final resolution of the Staff Concerns with TSTF-360, the ESBWR will address any agreed to changes to NUREG-1434.

DCD Impact

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

NRC RAI 16.2-56

The acceptance criteria for SR 3.8.4.2 is that each battery pilot cell voltage shall be > [2.07] v. Since the pilot cell voltage is assumed to be the mean value of several battery cells, the individual cell voltage will typically have a normal distribution about the mean. Therefore, to ensure 95% probability that no cell voltage is < 2.07 V the nominal pilot cell voltage should be at least 2 standard deviations above 2.07 V. Typically the nominal pilot cell voltage is > 2.13 V to provide reasonable assurance that the battery has sufficient capacity to perform its intended safety function. Provide justification for providing a bracket value of 2.07 volts. The bases for SR 3.8.4.2 should also be revised to include discussion of the methodology used to determine the minimum nominal pilot cell voltage.

GE Response

The NRC letter to the Technical Specification Task Force, dated April 11, 2006, "Request for Public Meeting to Discuss Enclosed Document Electrical Engineering Branch Concerns with Technical Specification Task Force (TSTF)-360, Revision 1 DC Electrical Rewrite," (ML061020636 and ML061100185) identifies the same issue as this RAI in "Staff Concern 3." TSTF-360 has already been incorporated into the BWR/6 Standard Technical Specifications (STS), NUREG-1434, Revision 3.1, and industry efforts to resolve this issue are ongoing.

The ESBWR Design Control Document (DCD) Chapter 16 Technical Specifications are based on the BWR/6 Standard Technical Specifications, NUREG-1434. It is GE's intent to maintain consistency with the latest approved Standard Technical Specifications to the extent practicable and applicable to the ESBWR design. Upon final resolution of the Staff Concerns with the TSTF-360, the ESBWR will address agreed to changes to NUREG-1434.

DCD Impact

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

NRC RAI 16.2-57

A low electrolyte temperature limits the current and power provided by the battery. SR 3.8.4.4 does not specify a bracket value for the pilot cell electrolyte temperature. Since the pilot cell electrolyte temperature is assumed to be the mean value of several battery cells, the electrolyte temperature for the individual cells will typically have a normal distribution about the mean. Therefore to ensure 95% probability that no battery cell electrolyte temperature is below the minimum design limit (MDL), a bracket value should be provided that is at least 2 standard deviations above the MDL. Provide justification for not providing a bracket value that is at least 2 standard deviations above the MDL. The bases for SR 3.8.4.4 should also be revised to include discussion of the methodology used to determine the minimum nominal pilot cell temperature.

GE Response

The NRC letter to the Technical Specification Task Force, dated April 11, 2006, "Request for Public Meeting to Discuss Enclosed Document *Electrical Engineering Branch Concerns with Technical Specification Task Force (TSTF)-360, Revision 1 DC Electrical Rewrite,*" (ML061020636 and ML061100185) identifies the same issue as this RAI in "Staff Concern 3." TSTF-360 has already been incorporated into the BWR/6 Standard Technical Specifications (STS), NUREG-1434, Revision 3.1, and industry efforts to resolve this issue are ongoing.

The ESBWR Design Control Document (DCD) Chapter 16 Technical Specifications are based on the BWR/6 Standard Technical Specifications, NUREG-1434. It is GE's intent to maintain consistency with the latest approved Standard Technical Specifications to the extent practicable and applicable to the ESBWR design. Upon final resolution of the Staff Concerns with the TSTF-360, the ESBWR will address agreed to changes to NUREG-1434.

DCD Impact

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

NRC RAI 16.2-58

DCD Tier 2, Rev. 1, Chapter 16, Page B 3.8.1-1, states, "These Isolation Power Centers have a hard-wired connections to a terminal box where a portable emergency generator may be connected in the event that power is not available from the PIP buses." Provide a list of the reference documents, that would specify the design requirements for the portable emergency generator, storage/security requirements, plant maintenance procedures, and periodic surveillance requirements, in this section.

GE Response

In response to NRC RAI 16.0-1, GE completed a systematic and comprehensive evaluation of Revision 1 of the ESBWR Design Control Document (DCD) to determine the ESBWR process variables, design features, operating restrictions, and structures, systems, or components (SSCs) that meet one or more of the four criteria in 10 CFR 50.36(c)(2)(ii). This evaluation was used to verify that Revision 1 of DCD Chapter 16, TS, includes the LCOs required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. The evaluation determined that the transportable AC generators did not meet the criteria for inclusion in the TS. The transportable AC generators provide a fifth option for non-safety related power sources for Isolation Power Centers (IPCs). The other non-safety related sources of power to the IPCs are the normal offsite source, the alternate offsite source, Plant Investment Protection (PIP) diesel generator (DG) A, and PIP DG B.

Although the hard-wired plug-in connections for the transportable AC generators are required by Sections 8.3.1.1.2 and 8.3.2.2.1 of Design Control Document (DCD) Tier 2, Rev. 1, the DCD does not specify that availability or use of the transportable AC generators is an essential element of the ESBWR design. Therefore, procurement, storage, security, maintenance and testing of the transportable AC generators mentioned in Sections 8.3.1.1.2 and 8.3.2.2.1 of DCD Tier 2, Rev. 1, will fall within the scope of COL Applicant responsibilities described in Section 8.3.4 of DCD Tier 2, Rev. 1. Design and procurement specifications for the transportable AC generators have not been drafted.

DCD Impact

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

NRC RAI 16.2-59

DCD, Tier 2, Rev. 1, Chapter 16, Bases 3.8.1, page B 3.8.1-1, should read: The standby battery changer can "be" used to equalize the associated battery off-line.

GE Response

Design Control Document (DCD) Tier 2, Rev.1 Chapter 16, LCO 3.8.1, "24-hour DC Sources – Operating," will be revised to correct this typographical error in a future revision.

DCD Impact

Design Control Document (DCD) Tier 2, Rev.1 Chapter 16, LCO 3.8.1, "24-hour DC Sources – Operating," will be revised to correct this typographical error in a future revision.

NRC RAI 16.2-60

DCD, Tier 2, Rev. 1, Chapter 16, Bases, Section 3.8.1, RA A.3, page B 3.8.1-5, should specify the power supply requirements for the alternate means of restoring battery terminal voltage. Explain whether the alternate means of restoring battery terminal voltage should rely on a power source that is independent of offsite power in order to justify the 7 day completion time.

GE Response

The NRC letter to the Technical Specification Task Force, dated April 11, 2006, "Request for Public Meeting to Discuss Enclosed Document Electrical Engineering Branch Concerns with Technical Specification Task Force (TSTF)-360, Revision 1 DC Electrical Rewrite," (ML061020636 and ML061100185) identifies the same issue as this RAI in "Staff Concern 1." TSTF-360 has already been incorporated into the BWR/6 Standard Technical Specifications (STS), NUREG-1434, Revision 3.1, and industry efforts to resolve this issue are ongoing.

The ESBWR Design Control Document (DCD) Chapter 16 Technical Specifications are based on the BWR/6 Standard Technical Specifications, NUREG-1434. It is GE's intent to maintain consistency with the latest approved Standard Technical Specifications to the extent practicable and applicable to the ESBWR design. Upon final resolution of the Staff Concerns with TSTF-360, the ESBWR will address any agreed to changes to NUREG-1434.

DCD Impact

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

NRC RAI 16.2-61

DCD Tier 2, Rev.1 Chapter 16, contains no proposed TS for the alternating current (AC) power system, including any degraded voltage protection. Explain why there is no degraded voltage alarms on the 480 volt buses that are the direct power feed to the safety-related battery chargers and inverters or the indirect feed to the inverter bus through the regulating transformer. Provide justification for no TS requirements (LCO, Applicability, Actions and Surveillance) for loss of voltage or degraded voltage instrumentation for the Isolation Power Center Buses in the proposed ESBWR TS LCO 3.3.

GE Response

In response to NRC RAI 16.0-1, GE completed a systematic and comprehensive evaluation of Revision 1 of the ESBWR Design Control Document (DCD) to determine the ESBWR process variables, design features, operating restrictions, and structures, systems, or components (SSCs) that meet one or more of the four criteria in 10 CFR 50.36(c)(2)(ii). This evaluation was used to verify that Revision 1 of DCD Chapter 16, TS, includes the LCOs required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. The evaluation determined that the offsite circuits, including alarms that would indicate degraded or loss of voltage for the offsite circuits, did not meet the criteria for inclusion in the TS. The ESBWR does not credit offsite and no onsite AC backup power source for the first 72 hours following a design basis accident. The Criterion 3 matrix specifies that the batteries support all safety-related DC power and safety-related vital AC power (via inverters). The results of this evaluation were provided in GE letter MFN 06-263, dated August 8, 2006.

As described in Tier 2, DCD Section 8.1.5.2.1, Rev. 1, the voltage of each 480V Isolation Power Center bus is monitored and the input breaker from the supporting PIP bus is tripped if the voltage is not within specified limits for a predetermined time. Therefore, the IPCs are provided with electrical protection and isolation devices that will prevent degradation of the Class 1E power system by the non-Class 1E power system. However, powering the IPCs from a non-safety-related power supply does not jeopardize plant safety because the safety-related batteries will supply required power during an emergency if the PIP bus is not within required voltage or frequency even if the IPC bus supply breakers do not trip. Therefore, undervoltage protection for the IPC buses does not meet criteria for inclusion in Technical Specifications.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 as a result of this RAI.

NRC RAI 16.2-62

DCD, Tier 2, Rev. 1, Section 8.2.1.2, states that two electrically independent and physically separate off-site AC power sources are provided. These AC power sources are designated as the normal and alternate preferred power sources and are use to power the Plant Investment Protection (PIP) buses. The PIP buses are used to power the Isolation Power Center Buses, which powers the Class 1E battery chargers and the Vital AC buses through a regulating transformer should an inverter failure were to occur. Although these AC sources are not Class 1E, they are or should be considered qualified circuits. Given that these qualified circuits are the preferred source of power for the battery chargers and backup supply for the Vital AC buses, provide justification for not including TS requirements (LCO, Applicability, Actions and Surveillance) for these circuits in the proposed ESBWR TS Section 3.8.

GE Response

In response to NRC RAI 16.0-1, GE completed a systematic and comprehensive evaluation of Revision 1 of the ESBWR Design Control Document (DCD) to determine the ESBWR process variables, design features, operating restrictions, and structures, systems, or components (SSCs) that meet one or more of the four criteria in 10 CFR 50.36(c)(2)(ii). This evaluation was used to verify that Revision 1 of DCD Chapter 16, TS, includes the LCOs required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. This evaluation determined that the offsite circuits did not meet the criteria for inclusion in the TS because the ESBWR does not credit offsite or onsite AC backup power sources for the first 72 hours following a design basis accident. The Criterion 3 matrix specifies that the batteries support all safety-related DC power and safety-related vital AC power (via inverters). The results of this evaluation were provided in GE letter MFN 06-263, dated August 8, 2006.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 as a result of this RAI.

NRC RAI 16.2-63

Provide the justification for having no proposed ESBWR TS LCO 3.8 surveillance requirements to:

a. Verify correct breaker alignment and indicated power availability for each Isolation Power Center Bus.

b. Verify automatic and manual transfer of AC power sources from the normal PIP bus to the alternate PIP bus.

GE Response

In response to NRC RAI 16.0-1, GE completed a systematic and comprehensive evaluation of Revision 1 of the ESBWR Design Control Document (DCD) to determine the ESBWR process variables, design features, operating restrictions, and structures, systems, or components (SSCs) that meet one or more of the four criteria in 10 CFR 50.36(c)(2)(ii). This evaluation was used to verify that Revision 1 of DCD Chapter 16, TS, includes the LCOs required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. The evaluation determined that the offsite circuits did not meet the criteria for inclusion in the TS because the ESBWR does not credit offsite or onsite AC backup power source for the first 72 hours following a design basis accident. The Criterion 3 matrix specifies that the batteries support all safety-related DC power and safety-related vital AC power (via inverters). The results of this evaluation were provided in GE letter MFN 06-263, dated August 8, 2006.

Because the offsite circuits did not meet the criteria for inclusion in the TS, the TS do not include requirements for periodic verification of either: a) correct breaker alignment and indicated power availability for each Isolation Power Center bus; or, b) automatic and manual transfer of AC power sources from the normal PIP bus to the alternate PIP bus.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 as a result of this RAI.

NRC RAI 16.2-64

Proposed TS LCO 3.9.6 uses three significant digits in the SI (7.01 m), but only two in the English (23 ft). If different number of digits are retained, identify what standard is being used when listing different numbers of significant figures in English and SI.

GE Response

The required water level over the top of the reactor pressure vessel flange in Design Control Document (DCD) Tier 2, Chapter 16, Technical Specification (TS) 3.9.6, Reactor Pressure Vessel (RPV) Water Level, and associated DCD Tier 2, Chapter 16B, Technical Specification Bases is derived from the guidance in Regulatory Guide 1.183, Appendix B, Section 2, which states that, for a depth of water above the damaged fuel of 23 feet or greater, the overall effective decontamination factor is 200 for the combination of elemental and organic species (i.e., 99.5% of the total iodine released from the damaged rods is retained by the water). Regulatory Guide 1.183 also states that the decontamination factor for noble gases is negligible (i.e., decontamination factor of 1). Regulatory Guide 1.183 is the basis for the fuel handling accident (FHA) parameters described in DCD Tier 2, Table 15.4-2, which provides the required water level only in terms of the pool water retention decontamination factors for iodine (200) and for noble gases (1). Therefore, the required water level over the top of the reactor pressure vessel flange is 23 feet.

The convention used in the TS and TS Bases is to provide all engineering values in both metric and English units, with the metric unit always the primary value regardless of the origin of the parameter. In this case, the original value is provided in English units (i.e., 23 feet as shown in Regulatory Guide 1.183;Appendix B, Section 2). Therefore, to ensure consistent significant digits, this parameter will be revised where applicable for TS 3.9.6 and the associated TS 3.9.6 Bases to state "7.01 m (23.0 feet)" in a future revision of DCD Chapter 16 and 16B.

DCD Impact

DCD Tier 2, Chapters 16 and 16B, will be revised as described above in a future revision.

NRC RAI 16.2-65

TS 3.10.1, "Inservice Leak and Hydrostatic Testing Operations", entry into Condition A, could result in entering the applicable condition of the effected LCO immediately. If the effected LCO is 3.6.3.1, "Reactor Building" (RB), this would result in various completion times, up to 7 days, since according to the bases, minimal credit is taken for the existence of the RB surrounding the primary containment vessel in any radiological analyses. During this time TS 3.10.1 would still allow testing to occur. Standard Technical Specifications (STS) for secondary containment (NUREG-1434 TS 3.6.4.1) and secondary containment isolation valves (NUREG-1434 TS 3.6.4.2) recommend immediate suspension of testing, restore operability of secondary containment or secondary containment isolation valves within a matter of hours, and cooldown to below 200F within 36 hours if operability could not be restored. In consideration that TSTF-484 is under review and ESBWR seeks to use TS 3.10.1 for scram time testing activities, provide the technical justification for allowing testing to occur in Mode 5, with reactor coolant temperature greater than 200F, and with an inoperable Reactor Building for an extended period of time.

GE Response

DCD Tier 2, Rev.1 Chapter 16, LCO 3.10.1, "Inservice Leak and Hydrostatic Testing Operation," allows reactor coolant temperatures greater than 93.3°C (200°F) when in Mode 5 to facilitate performance of inservice leak and hydrostatic testing if specified LCOs that are not normally required in Mode 5 are met. If one or more of the specified LCOs are not met, LCO 3.10.1, Required Action A.1, provides the option of immediately taking the Actions for the LCO not being met. Required Action A.1 is modified by a Note that clarifies that if the Actions for the LCO not being met include entry into Mode 5, then the allowance provided by LCO 3.10.1 to disregard Mode 5 temperature requirements is no longer applicable and reactor coolant temperature must be reduced to less than 93.3°C (200°F).

For the ESBWR Technical Specifications, the Note to LCO 3.10.1, Required Action A.1, may not always require that reactor coolant temperature be reduced to less than 93.3°C (200°F) because LCOs that are applicable in Modes 1, 2, 3 and 4 do not always require entry into Mode 5 when the LCO is not met. Therefore, GE will revise the Note to LCO 3.10.1, Required Action A.1, to state:

> Required Actions to be in MODE 3 include reducing average reactor coolant temperature to ≤ 93.3°C (200°F) within 36 hours.

This change will ensure that reactor coolant temperature will be reduced to less than 93.3°C (200°F) within 36 hours if LCO 3.10.1, Required Action A.1, is selected if any requirement of LCO 3.10.1 is not met.

DCD Impact

DCD Tier 2, Rev.1 Chapter 16, LCO 3.10.1, "Inservice Leak and Hydrostatic Testing Operation," will be revised as described above in a future revision.

NRC RAI 16.2-66

Explain the differences in the SR frequencies for NUREG-1434 STS SR 3.10.5.1 and the proposed ESBWR TS SR 3.10.5.1.

GE Response

GE will revise Design Control Document (DCD) Tier 2, Section 16B.3.10.5, "CRD Removal – Refueling," so that the frequency for surveillance requirement (SR) 3.10.5.1 is the same as the frequency used in Standard Technical Specifications (STS) NUREG-1434, Revision 3.1, for the same SR in STS LCO 3.10.5.

DCD Impact

DCD Tier 2, Rev.1 Chapter 16, LCO 3.10.1, "CRD Removal – Refueling," will be revised as described above in a future revision.

NRC RAI 16.2-67

NUREG-1434 STS 5.2.2 has a Reviewer's Note requiring 3 non licensed operators present when both units are shut down at a two unit site. Explain omission of this Reviewer's Note from the proposed ESBWR TS section.

GE Response

NUREG 1434, Specification 5.2.2, is accompanied by a Reviewer's Note stating: "Two unit sites with both units shutdown or defueled require a total of three nonlicensed operators for the two units." DCD Tier 2, Subsection 1.1.2.3 states "[f]or the purpose of this document [i.e., ESBWR DCD Tier 2], only a single standard unit is considered." The ESBWR Standard Design is a single unit plant and therefore will not share Structures, Systems, and Components. Therefore, this Reviewer's Note requiring 3 non-licensed operators present when both units are shutdown at a two unit site is not applicable. However, as a result of discussions of this RAI with the NRC reviewer during a conference call held on September 13, 2006, GE will revise ESBWR DCD Tier 2, Chapter 16, Specification 5.2.2, to include the NUREG 1434, Specification 5.2.2, Reviewer's Note.

DCD Impact

This revision will be provided in a future update of ESBWR DCD Tier 2, Chapter 16.

NRC RAI 16.2-68

Justify excluding the Post Accident Sampling section from the proposed ESBWR TS 5.0 or confirm that NEDO-32991 Rev.0, "Regulatory Relaxation for Post Accident Sampling Stations" is implemented for the ESBWR TS.

GE Response

NUREG-1434, Specification 5.5.3, "Post Accident Sampling," requires a program to ensure the capability to obtain and analyze reactor coolant, radioactive gases, and particulates in plant gaseous effluents and containment atmosphere samples under accident conditions. This program was not included in the ESBWR DCD, Chapter 16, Technical Specifications. A Reviewer's Note associated with NUREG-1434, Specification 5.5.3 allows the program to be eliminated based on the implementation of NEDO-32991, Revision 0, "Regulatory Relaxation For BWR Post Accident Sampling Stations (PASS)," and the associated NRC Safety Evaluation dated June 12, 2001.

ESBWR DCD Tier 2, Revision 1, Appendix 1A, "Response to TMI Related Matters," Table 1A-1, "TMI Action Plan Items," addresses the ESBWR resolution of the Three Mile Island (TMI) Action Plan Items listed in 10 CFR 50.34(f). The resolution to TMI Item II.B.3 describes the ESBWR capabilities for post accident sampling, referencing DCD Tier 2, Subsections 7.5.2, 7.5.3, 9.3.2, and 11.5 for additional discussion locations. NEDO-32991 is not referenced in Revision 1 of the ESBWR DCD. GE intends to implement the guidance of NEDO-32991 and the associated NRC safety evaluation in the ESBWR DCD.

No changes will be made to the ESBWR DCD, Chapter 16 as a result of this RAI. However, GE will revise DCD Appendix 1A, and DCD Subsections 7.5.2, 7.5.3, 9.3.2, 11.5, and other sections as necessary, to implement the PASS related changes addressed in NEDO-32991 and the associated NRC safety evaluation.

DCD Impact

DCD Tier 2, Appendix 1A, and DCD Tier 2, Subsections 7.5.2, 7.5.3, 9.3.2, 11.5, and other sections as necessary, will be revised in a future update as noted in the above discussion.

NRC RAI 16.2-69

Propose modifications to DCD Tier 2, Rev. 1, Chapter 16, TS 5.5.5.b and associated Bases to include a two year limit in the Inservice Testing program to assure the provisions of SR 3.0.2 are only applied to valves with a test frequency of 2 years or less.

GE Response

DCD Tier 2, Rev. 1, Chapter 16, TS 5.5.5.b currently applies the provisions of SR 3.0.2 to the required Frequencies and other normal and accelerated Frequencies specified in the Inservice Testing Program for performing inservice testing activities. This presentation is consistent with the requirement provided in NUREG-1434, Revision 3.1, TS 5.5.7.b. The NRC is currently reviewing a generic change proposed by the NEI Technical Specification Task Force (TSTF) related to this requirement. TSTF-497, "Limit Inservice Testing Program SR 3.0.2 Application to Frequencies of 2 Years or Less," revises paragraph b of the Inservice Testing Program to state, "The provisions of SR 3.0.2 are applicable to the above required Frequencies and to other normal and accelerated Frequencies specified as 2 years or less in the Inservice Testing Program for performing inservice testing activities."

DCD Impact

GE will address incorporation of TSTF 497 in DCD Tier 2, Chapter 16, TS 5.5.5.b, as appropriate for the ESBWR design in a future update of DCD Tier 2, Chapter 16, following approval of TSTF-497 by the NRC.

NRC RAI 16.2-70

Justify excluding the methodology for determining Liquid Leakage from the explosive gas monitoring program in the proposed ESBWR TS 5.5.6.

GE Response

NUREG-1434, TS 5.5.9 provides the following requirements for the Explosive Gas and Storage Tank Monitoring program: "This program provides controls for potentially explosive gas mixtures contained in the [Waste Gas Holdup System], [the quantity of radioactivity contained in gas storage tanks or fed into the offgas treatment system, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks]. The gaseous radioactivity quantities shall be determined following the methodology in [Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure"]. The liquid radwaste quantities shall be determined in accordance with [Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures"]."

DCD Tier 2, Revision 1, Section 11.2 describes the ESBWR Liquid Waste Management System. As described in Section 11.2, the ESBWR design does not include unprotected outdoor liquid radwaste storage tanks; therefore, a methodology for determining liquid leakage due to failure of unprotected outdoor liquid radwaste storage tanks is not incorporated. However, as a result of discussions of this RAI with the NRC reviewer during a conference call held on September 13, 2006, GE will revise ESBWR DCD Tier 2, Chapter 16, Specification 5.5.6, to include the methodology for determining liquid leakage as a bracketed option, consistent with the presentation in NUREG-1434.

DCD Impact

DCD Tier 2, Chapter 16, Specification 5.5.6 will be revised in a future update as noted in the above discussion.

NRC RAI 16.2-71

Justify excluding the surveillance program for outdoor liquid radwaste tanks, not surrounded by liners, dikes, or walls capable of holding the tanks contents, from the Explosive Gas Monitoring proposed ESBWR TS 5.5.6.

GE Response

NUREG-1434, TS 5.5.9, Item c, provides the following requirements for the Explosive Gas and Storage Tank Monitoring program: "A surveillance program to ensure that the quantity of radioactivity contained in all outdoor liquid radwaste tanks that are not surrounded by liners, dikes, or walls, capable of holding the tanks' contents and that do not have tank overflows and surrounding area drains connected to the [Liquid Radwaste Treatment System] is less than the amount that would result in concentrations less than the limits of 10 CFR 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an unrestricted area, in the event of an uncontrolled release of the tanks' contents."

DCD Tier 2, Revision 1, Section 11.2 describes the ESBWR Liquid Waste Management System. As described in Section 11.2, the ESBWR design does not include outdoor liquid radwaste storage tanks; therefore, a methodology for determining liquid leakage due to failure of outdoor liquid radwaste storage tanks is not incorporated. However, as a result of discussions of this RAI with the NRC reviewer during a conference call held on September 13, 2006, GE will revise ESBWR DCD Tier 2, Chapter 16, Specification 5.5.6, to include the surveillance program for outdoor liquid radwaste tanks, not surrounded by liners, dikes, or walls capable of holding the tanks contents as a bracketed option, consistent with the presentation in NUREG-1434.

DCD Impact

DCD Tier 2, Chapter 16, Specification 5.5.6 will be revised in a future update as noted in the above discussion.

NRC RAI 16.2-72

Note 1 to the Actions table of TS 3.3.3.1, Post Accident Monitoring Instrumentation, states "LCO 3.0.4.c is applicable." As stated, it is unclear what the note means. Do you mean to say "the MODE entry restrictions of LCO 3.0.4 are not applicable?"

GE Response

GE will revise Design Control Document (DCD) Tier 2, Rev. 1, Chapter 16, LCO 3.3.3.1, Post-Accident Monitoring (PAM) Instrumentation, and the associated Bases, to delete the reference to LCO 3.0.4.c in Note 1 to the Actions because the note is not required for the proper application of LCO 3.0.4.

DCD Impact

Design Control Document (DCD) Tier 2, Chapters 16 and 16B, LCO 3.3.3.1, Post-Accident Monitoring (PAM) Instrumentation," will be revised as described above in a future revision.

NRC RAI 16.2-78

DCD Tier 2, Rev. 1 section 9.1.3 states that pipes equipped with normally closed manual valves are provided for establishing flow paths from off-site emergency water supplies or the Fire Protection System to refill the IC/PCCS pools following a design basis loss of coolant accident. DCD Tier 1 Figure 2.6.2-1 indicates that the emergency makeup connections and the makeup water supply from the Fire Protection System each pass through a single isolation valve and a single check valve into a common header for makeup to the IC/PCCS pools.

Describe the surveillance testing (including inservice testing) that would apply to the valves in the makeup water transfer line from the fire protection water system and the off-site water supply sources. Describe the Action that would apply if one or more of the valves in the makeup lines were to fail a surveillance test. Propose modifications to TS 3.7.5 and the associated Bases that more clearly define the applicable TS Action for inoperable valves in the makeup line.

GE Response

Portions of the Fire Protection System provide makeup water to the Isolation Condenser/Passive Containment Cooling (IC/PCC) and Spent Fuel pools to extend passive cooling to at least 7 days from the initiating event. This makeup function is not required during the first 72 hours following the initiating event. In response to NRC RAI 16.0-1, GE completed a systematic and comprehensive evaluation of Revision 1 of the ESBWR Design Control Document (DCD) to determine the ESBWR process variables, design features, operating restrictions, and structures, systems, or components (SSCs) that meet one or more of the four criteria in 10 CFR 50.36(c)(2)(ii). This evaluation was used to verify that Revision 1 of DCD Chapter 16, Technical Specifications (TS), includes the LCOs required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. The results of this evaluation were provided to the NRC by GE letter MFN 06-263, dated August 8, 2006.

The Fire Protection System function providing makeup water to the IC/PCC and Spent Fuel pools was specifically evaluated in the Criterion 4 matrix, line item 1, of the response to RAI 16.0-1. This evaluation determined that the makeup flow path from off-site emergency water supplies or the fire protection system did not meet the criteria for inclusion in the TS. This function is not required during the first 72 hours following the initiating event. The portions of the system required for the IC/PCC and Spent Fuel pools makeup function are considered, however, for regulatory treatment of non-safety systems (RTNSS) Criteria B designation.

GE provided the following commitment related to RTNSS SSCs in letter MFN 06-263: "Consistent with the guidance of SECY-94-084, 'Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs,' dated March 28, 1994, and SECY-95-132, 'Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs (SECY-94-084),' dated May 22, 1995, GE will provide appropriate 'short-term availability controls' in the form of 'simple Technical Specification' for the RTNSS SSCs identified in DCD Appendix 1D in a future revision of the DCD. These controls will be presented in the DCD consistent with forthcoming guidance being developed as DG-1145." GE expects these regulatory controls to include the surveillance testing (including inservice testing) that would apply to the valves in the makeup water transfer line from the fire protection water system and the off-site water supply sources and the Actions that would apply if one or more of the valves in the makeup lines were to fail a surveillance test.

It should be noted that the Fire Protection System flow path providing makeup water to the IC/PCC and Spent Fuel pools is the subject of other RAIs, such as RAI 9.1-13. In the response to RAI 9.1-13, provided to the NRC by GE letter MFN 06-309, dated September 8, 2006, GE proposed a modification to the design to include two parallel valves in the makeup water supply line from the Fire Protection System to ensure that the capability to provide makeup water from the Fire Protection System to the IC/PCC and Spent fuel Pools is available for the first seven days even if a single active failure were to occur.

DCD Impact

No changes will be made to DCD Tier 2, Chapter 16 as a result of this RAI.

NRC RAI 16.2-79

DCD Tier 2, Rev. 1, section 9.1.3 states that pipes equipped with normally closed manual valves are provided for establishing flow paths from the Fire Protection System to refill the IC/PCCS pools following a design basis loss of coolant accident. However, the Bases proposed for TS 3.7.5 state only that the Fuel and Auxiliary Pools Cooling System includes flow paths for post-accident make-up water transfer from off-site water supply sources to the IC/PCCS pools.

Clarify the function of the fire protection water system as a source of makeup by proposing changes to the Bases for TS 3.7.5. Describe how failures affecting the reliability or redundancy of the fire protection water system as a makeup water source would be treated with respect to operability of the IC/PCCS pool. Propose modifications to TS 3.7.5 and the associated Bases that more clearly define the applicable TS Action for degraded Fire Protection System capability.

GE Response

Portions of the Fire Protection System provide makeup water to the Isolation Condenser/Passive Containment Cooling (IC/PCC) and Spent Fuel pools to extend passive cooling to at least 7 days from the initiating event. This makeup function is not required during the first 72 hours following the initiating event. In response to NRC RAI 16.0-1, GE completed a systematic and comprehensive evaluation of Revision 1 of the ESBWR Design Control Document (DCD) to determine the ESBWR process variables, design features, operating restrictions, and structures, systems, or components (SSCs) that meet one or more of the four criteria in 10 CFR 50.36(c)(2)(ii). This evaluation was used to verify that Revision 1 of DCD Chapter 16, Technical Specifications (TS), includes the LCOs required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. The results of this evaluation were provided to the NRC by GE letter MFN 06-263, dated August 8, 2006.

The Fire Protection System function providing makeup water to the IC/PCC and Spent Fuel pools was specifically evaluated in the Criterion 4 matrix, line item 1, of the response to RAI 16.0-1. The evaluation determined that the makeup flow path from off-site emergency water supplies or the fire protection system did not meet the criteria for inclusion in the TS. This function is not required during the first 72 hours following the initiating event. The portions of the system required for the IC/PCC and Spent Fuel pools makeup function are considered, however, for regulatory treatment of non-safety systems (RTNSS) Criteria B designation.

GE provided the following commitment related to RTNSS SSCs in letter MFN 06-263: "Consistent with the guidance of SECY-94-084, 'Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs,' dated March 28, 1994, and SECY-95-132, 'Policy and Technical Issues Associated with the Regulatory Treatment of Non-Safety Systems in Passive Plant Designs (SECY-94-084),' dated May 22, 1995, GE will provide appropriate 'short-term availability controls' in the form of 'simple Technical Specification' for the RTNSS SSCs identified in DCD Appendix 1D in a future revision of the DCD. These controls will be presented in the DCD consistent with forthcoming guidance being developed as DG-1145." GE expects these regulatory controls to address failures affecting the reliability or redundancy of the fire protection water system as a makeup water source with respect to operability of the IC/PCCS pool.

The Bases for TS 3.7.5, "Isolation Condenser (IC)/Passive Containment Cooling (PCC) Pools," Background discussion currently states: "The FAPCS includes flow paths for post-accident make-up water transfer, from off-site water supply sources to the IC/PCCS pools." GE will revise DCD Chapter 16, TS 3.7.5, Bases Background paragraph 9 to state: "The FAPCS includes flow paths for post-accident make-up water transfer, from the fire protection system and off-site water supply sources to the IC/PCCS pools." This revision will be provided in a future update of DCD Tier 2, Chapter 16.

DCD Impact

DCD Tier 2, Chapter 16B for TS B 3.7.5 will be revised as described above in a future revision.

NRC RAI 16.2-80

DCD Tier 2, Rev.1 Chapter 16, TS 4.3.2, "Drainage," states that the fuel storage pools are designed and shall be maintained with features to prevent inadvertent drainage below an unspecified elevation. Provide descriptive information regarding the minimum elevation used for drainage prevention features.

GE Response

ESBWR Technical Specification (TS) 4.3.2, "Drainage," specifies that the fuel building spent fuel pool (SFP) and the reactor building buffer pool deep pit (buffer pool) are "designed and shall be maintained to prevent inadvertent draining of the pool below" a specified elevation. GE will revise TS 4.3.2 to use pool level instead of plant elevation so that the requirement is more clearly stated and a plant specific elevation is not required to eliminate the bracketed value. Otherwise, the presentation of the requirements is consistent with the presentation of the requirements in NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6," Revision 3.1. NUREG-1434, Revision 3.1, and ESBWR TS 4.3.2 do not provide descriptive information regarding the minimum elevation used for fuel storage pool drainage prevention features.

Additional descriptive information explaining how the ESBWR SFP and buffer pool meet the guidelines in SRP Section 9.1.3, Revision 3, July 1981, Criterion III.1.e, has been provided in responses to RAIs 9.1-9 and 9.1-11 in Request for Additional Information Letter No. 54 Related to ESBWR Design Certification Application, dated August 23, 2006. The General Electric responses to RAIs 9.1-9 and 9.1-11 were submitted in Letter MFN 06-309, "Response to NRC Request for Additional Information Letter No. 54 Related to ESBWR Design Certification Application, dated September 8, 2006.

DCD Impact

No Design Control Document (DCD) changes will be made in response to this RAI.