October 4, 2006

Mr. David H. Hinds, Manager, ESBWR
General Electric Company
P.O. Box 780, M/C L60
Wilmington, NC 28402-0780

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 63 RELATED TO ESBWR DESIGN CERTIFICATION APPLICATION

Dear Mr. Hinds:

By letter dated August 24, 2005, General Electric Company (GE) submitted an application for final design approval and standard design certification of the economic simplified boiling water reactor (ESBWR) standard plant design pursuant to 10 CFR Part 52. The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed design.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter. The RAI questions are related to the ESBWR design control document (DCD), Tier 2, Revision 1, Chapter 16, Technical Specifications.

RAI questions 16.0-2 through 16.0-7, and 16.2-10 through16.2-80 were sent to you in draft form via electronic mail on August 12, 2006. A telecon was held with your staff on August 24, 2006, and you provided clarification on draft RAI questions 16.0-2, 16.2-15, 16.2-23, 16.2-32, 16.2-33, 16.2-40, 16.2-41, 16.2-45, 16.2-49, 16.2-62, and 16.2-63, causing RAI question 16.2-23 to be withdrawn and RAI questions 16.2-32 and 16.2-33 to be combined. The staff drafted a new question that has been numbered RAI 16.2-23.

Another telecon was held with your staff on September 13, 2006 to discuss draft RAI questions 16.0-5, 16.2-52, 16.2-66, 16.2-67, 16.2-70, 16.2-71, 16.2-73, and 16.2-75. You provided clarification on these RAI questions, causing 16.2-52 and 16.2-75 to be withdrawn.

Currently, RAI Numbers 16.2-33, 16.2-52 and 16.2-75 are placeholders and may be used at a later date for additional RAI questions from the staff. You agreed to respond to this set of RAI questions on the following schedule:

October 31, 2006: 16.0-2 through 16.0-6, 16.2-10 through 16.2-13, 16.2-15 through 16.2-22, 16.2-31, 16.2-34 through 16.2-40, 16.2-42 through 16.2-44, 16.2-47 through 16.2-49, 16.2-53, 16.2-58, 16.2-59, 16.2-62 through 16.2-64, 16.2-66 through 16.2-72, 16.2-74, 16.2-80.

November 22, 2006: 16.0-7, 16.2-14, 16.2-23, 16.2-24, 16.2-25, 16.2-30, 16.2-32, 16.2-41,16.2-45, 16.2-46, 16.2-50, 16.2-51, 16.2-54 through 16.2-57,16.2-60, 16.2-61, 16.2-65, 16.2-73, 16.2-76 through 16.2-79.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-4115 or mcb@nrc.gov or Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Martha Barillas, Project Manager
ESBWR/ABWR Projects Branch
Division of New Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 52-010

Enclosure: As stated

cc w/encl: See next page

October 31, 2006: 16.0-2 through 16.0-6, 16.2-10 through 16.2-13, 16.2-15 through 16.2-22, 16.2-31, 16.2-34 through 16.2-40, 16.2-42 through 16.2-44, 16.2-47 through 16.2-49, 16.2-53, 16.2-58, 16.2-59, 16.2-62 through 16.2-64, 16.2-66 through 16.2-72, 16.2-74, 16.2-80.

November 22, 2006: 16.0-7, 16.2-14, 16.2-23, 16.2-24, 16.2-25, 16.2-30, 16.2-32, 16.2-41,16.2-45, 16.2-46, 16.2-50, 16.2-51, 16.2-54 through 16.2-57,16.2-60, 16.2-61, 16.2-65, 16.2-73, 16.2-76 through 16.2-79.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-4115 or mcb@nrc.gov or Amy Cubbage at (301) 415-2875 or aec@nrc.gov.

Sincerely,

/RA/

Martha Barillas, Project Manager
ESBWR/ABWR Projects Branch
Division of New Reactor Licensing
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Docket No. 52-010

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cc w/encl: See next page

ACCESSION NO. ML062720166

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NAME	MBarillas	JColaccino
DATE	10/03/2006	10/04/2006

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Requests for Additional Information (RAIs)
ESBWR DCD Tier 2, Rev. 1,Chapter 16, Technical Specifications (TS)
(STS refers to NUREG-1434, "Standard Technical Specifications, General Electric Plants, BWR/6," Revision 3.1)

RAI Number	Reviewer	RAI Summary	RAI
16.0-2	Harbuck C	Explain use of brackets and Reviewer's Notes.	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.
16.0-3	Harbuck C	Provide list of TSTF travelers adopted for the ESBWR that are excluded from STS, Rev 3.1.	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.
16.0-4	Harbuck C	Justify completion times to place the plant in Modes 3, 4 and 5.	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 the end state is appropriate (Mode 3, Mode 4, or Mode 5).
16.0-5	Hearn P	Explain omission of Specifications based on STS in Plant Systems (3.7), Refueling Operations (3.9), and Programs and Manuals (5.5).	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).

Enclosure

RAI Number	Reviewer	RAI Summary	RAI
16.0-6	Hearn P	Clarify the correct STS version referenced.	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.
16.0-7	Roth D	Identify LCOs where TSTF-423 is applied to the ESBWR. For each LCO where TSTF-423 end states are requested, provide justification.	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 the BWR products (BWR-2 through 6)." Justify applying the topical report to 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.
16.2-10	Harbuck C	Explain deviation from Leakage definition of NUREG-1434 STS.	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.
16.2-11	Hearn P	Explain omitted STS Physics Test definition for the ESBWR.	Using NUREG-1434, Rev. 3.1 as guidance, justify exclusion of the Physics Tests (Max Fraction of Limiting Power Density) definition from the proposed ESBWR TS Definitions Section 1.1.

RAI Number	Reviewer	RAI Summary	RAI
16.2-12	Harbuck C	Explain deviation from STS Definition of Shutdown Margin (SDM).	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.
16.2-13	Harbuck C	Provide illustration of use of MODE 4 end state.	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).
16.2-14	Tjader T	Justify omission of the SL value from TS 2.1.1.2.	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.
16.2-15	Harbuck C	Explain application of new MODE 4 definition to LCO 3.0.3, LCO 3.0.4, SR 3.0.1 and SR 3.0.4	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.
16.2-16	Tjader T	Provide LCO 3.0.3 MODE 5 completion time.	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.
16.2-17	Harbuck C	Discuss if the AP1000 LCO 3.0.8 is applicable to the ESBWR for adoption into its TS.	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-18	Tjader T	Explain omission of TS 3.1.1 RAs D.4 & E.5 as presented in NUREG-1434.	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.
16.2-19	Tjader T	Justify the condition presented by using the word "each" in TS 3.1.3, Required Action A.3 Completion Time.	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.
16.2-20	Tjader T	Explain SR 3.1.3.2 and SR 3.1.3.3 requirements to move CRs 2 notches.	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.
16.2-21	Tjader T	Explain discrepancy in TS 3.1.4 SR Note and Bases.	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.
16.2-22	Tjader T	Explain S 3.1.4: Table Note c) in Bases.	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-23	Harbuck C	Verify that definition of CFT in SR 3.9.1.1 is appropriate.	Proposed SR 3.9.1.1 requires performing a CHANNEL FUNCTIONAL TEST on the required refueling equipment interlock inputs. Verify that the appropriate definition of CFT will be used in view of the likelihood that the digital I&C will have a different definition. This comment may be related to RAI 16.2-26.
16.2-24	Tjader T	Explain omission of NUREG-1434 STS 3.2.1 & STS 3.2.4 in ESBWR TS.	Explain why NUREG-1434, Rev. 3.1, TS 3.2.1, "Average Planar Linear Heat Generation Rate (APLHGR)" and STS 3.2.4, "Average Power Range Monitor (APRM) Gain and Setpoints" are not included in the proposed ESBWR TS.
16.2-25	Schulten C	Provide the updated TS adoption of TSTF-493 and LSSS during periodic testing and calibration of instrument channels.	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.
16.2-30	Raval J Walker H	Provide additional information regarding TS Section 3.7.1, Emergency Breathing Air System (EBAS).	The staff proposes the following additions the ESBWR TS Section 3.7.1, Emergency Breathing Air System (EBAS): a. Add an "Action Item" as follows: ACTION CONDITION: Control room temperature not within limit REQUIRED ACTION: Restore control room air temperature to within limit COMPLETION TIME: "XX" hours (Applicant should provide completion time)

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			b. Provide a new SURVEILLANCE REQUIREMENTS (SR) 3.7.1.X1 for air quality of the air storage tanks to meet the requirements of Appendix C, Table C-1 of ASHRAE Standard 62 and associated "FREQUENCY" of "7 days." c. Restate SR 3.7.1.4 to state "Verify that each EBAS train maintains the control room boundary at a positive pressure of 31Pascals (0.125 inches of W.G.) relative to the adjacent areas at the required air addition flow rate of 9.5 liter/second (100 scfm) ± tolerance limit (i.e., 0.5 liter/second (5 scfm) using the safety related EBAS air storage tanks." Also, provide SR FREQUENCY as "24 months." d. Provide a new SR 3.7.1.X2 for EBAS pressure relief isolation valves to state "Verify that each EBAS pressure relief isolation valve within the control room boundary is OPERABLE." Also, provide SR FREQUENCY as "In accordance with the Inservice Testing Program." e. Provide a new SR 3.7.1.X3 for EBAS pressure relief dampers to state "Verify that each EBAS pressure relief damper is OPERABLE." Also, provide SR FREQUENCY as "24 months." f. Provide a new SR 3.7.1.X4 for EBAS pressure regulating valves to state "Verify that pressure regulating valve in each EBAS train is OPERABLE." Also, provide "SR FREQUENCY" as "In accordance with the Inservice Testing Program." g. Provide the associated BASES information in details for the above LCO Action Items and SRs in DCD Tier 2 Section B.3.7.1, "Emergency Breathing Air System (EBAS)."

RAI Number	Reviewer	RAI Summary	RAI
			h. In DCD Tier 2 Chapter 16, Technical Specifications 3.7.1, "Emergency Breathing Air System," the applicant did not provide a list of Codes and Standards used in Technical Specifications 3.7.1. The Technical Specifications Bases typically reference ASTM Standards, ASHRAE Standards, Regulatory Guides, the Code of Federal Regulations, and others. Therefore, the applicant should provide (as references) a list of Codes and Standards used in the Bases of Technical Specifications 3.7.1. The NRC staff expects a commitment to the latest revisions of the applicable Codes and Standards included in the DCD.
16.2-31	Roth D	Fix editorial difference in SRV abbreviation.	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-32	Roth D	Provide Conditions for combination of ADS and GDCS inoperable.	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."

RAI Number	Reviewer	RAI Summary	RAI
16.2-34	Roth D	Clarify relationship of 3.4.1 (Safety Relief Valves) and 3.5.1 (Automatic Depressurization System (ADS) - Operating) LCOs	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-35	Roth D	Describe Squib testing during plant operation.	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.
16.2- 36	Roth D	Explain difference in TS and Bases for SR 3.5.3.1 GDCS - Shutdown.	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-37	Roth D	Justify different acceptance criteria for GDCS pools in GDCS - Operating and GDCS - Shutdown	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.
16.2-38	Roth D	Provide TS 3.5.2 GDCS Pool Operability LCO.	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).
16.2-39	Roth D	Explain what is meant by “Required GDCS Pools."	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-40	Roth D	Justify TS 3.5.3 GDCS Pools not stating temperature limits.	Justify not having temperature limits for TS 3.5.3 GDCS pools or incorporate into Pool Operability LCO if needed.
16.2-41	Roth D	Justify no ICS Pool Level and Temperature SR.	10 CFR 50.36(c)(3) states that TS will include items surveillance requirements, 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 LCO will be met. Provide justification for not having Isolation Condenser System ICS SR requiring verification every 24 hours of: a. Shellside water level > 6 feet; and b. Shellside water temperature < 210F.
16.2-42	Roth D	Justify no ICS capability SR.	10 CFR 50.36(c)(3) states that TS will include items surveillance requirements, 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. Provide justification for not having Isolation Condenser System SR requiring verification every 60 months of the ICS capability to remove the design heat load.
16.2-43	Harbuck C	Explain end state for TS 3.6 in relation to the applicability Modes.	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)?

RAI Number	Reviewer	RAI Summary	RAI
16.2-44	Harbuck C	Explain omission of Note for STS 3.6.1.2 Required Actions A.3 & B.3.	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?
16.2-45	Harbuck C	Justify deviation from NUREG-1434 STS 3.6.1.3 Applicability.	Justify deviations from NUREG-1434, Rev.3, STS 3.6.1.3 Applicability - are no ESBWR containment isolation instrumentation functions required in Mode 5?
16.2-46	Harbuck C	STS 3.6.1.7 and RWCU/SDC system spray function flow limit verification.	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.
16.2-47	Harbuck C	Justify 24-month Frequency for SR 3.6.1.6.3 instead of 31 days frequency stated in NUREG-1433 SR 3.6.1.8.2.	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.
16.2-48	Harbuck C	Justify exclusion of NUREG-1433 SR 3.6.1.8.3 in TS 3.6.1.6.	Justify not including NUREG-1433 SR 3.6.1.8.3, “Verify opening setpoint of each required vacuum breaker is $\leq$[0.5]psid, in proposed ESBWR TS 3.6.1.6.
16.2-49	Harbuck C	Explain omission of TS 3.6.1.6 SR for butterfly and solenoid valves.	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?

RAI Number	Reviewer	RAI Summary	RAI
16.2-50	Harbuck C	TS 3.6.3.1: Reactor building leakage testing and flow path isolation.	TS SR 3.6.3.1.4 has no analogous surveillance in the BWR/4 secondary containment and secondary containment isolation valve specifications in NUREG-1433, Rev 3.1. Discuss the flow paths to be isolated and the method to be used for conducting the test and the justification for the 60-month Frequency.
16.2-51	Hearn P	Justify exclusion of a SR on the air supply valves of TS 3.7.1.	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 proposed TS Section 3.7.1.
16.2-53	Hearn P	Justify frequency extension of SR 3.7.3.1 stated in NUREG-1434, to ESBWR proposed TS.	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.
16.2-54	Harbuck C	Adopt TSTF-448, Rev 3 into the ESBWR DCD, Chapter 16.	Staff & industry have reached agreement on control room envelope habitability STS improvements with action, surveillance, and administrative requirements for the CRE boundary. Adopt TSTF-448, Rev 3 in the next ESBWR DCD revision.

RAI Number	Reviewer	RAI Summary	RAI
16.2-55	Clark R McConnell M	Explain why no SR is given for specific gravity in TS LCO 3.8.4.	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 indiction 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 indiction 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).
16.2-56	Clark R McConnell M	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 minium nominal pilot cell voltage.	The acceptance criteria for proposed TS SR 3.8.4.2 is that each battery pilot cell voltage shall be $\geq$[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 $\leq$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 $\geq$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 minium nominal pilot cell voltage.

RAI Number	Reviewer	RAI Summary	RAI
16.2-57	Clark R	Provide justification for not providing a bracket value that is at least 2 standard deviations above the MDL.	A low electrolyte temperature limits the current and power provided by the battery. Proposed TS 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 percent 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 minium nominal pilot cell temperature.
16.2-58	Clark R	State references specifying design requirements for the portable emergency generator, storage/security requirements, plant maintenance procedures, and periodic surveillance requirements.	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.
16.2-59	Clark R	Correct editorial mistype in TS Bases 3.8.1.	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-60	Clark R	Specify the power supply requirements for the alternate means of restoring battery terminal voltage.	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.
16.2-61	Clark R McConnell M Morris G	Justify no TS requirements for loss of voltage or degraded voltage instrumentation for proposed TS LCO 3.3.	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.
16.2-62	Clark R	Justify not including TS requirements (LCO, Applicability, Actions and Surveillance) for these circuits in TS Section 3.8.	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-63	Clark R	Justify omission of SR to LCO 3.8 regarding breaker alignment and power availability, and to verify automatic and manual transfer of AC power to PIP bus.	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.
16.2-64	Roth D	Fix significant figures in TS	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-65	Lewin A	Justify application of TS 3.10.1 for scram time testing using TSTF-484 as guidance.	Proposed 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 200 °F 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 200 °F, and with an inoperable Reactor Building for an extended period of time.
16.2-66	Grover R	Explain difference in ESBWR TS SR 3.10.5.1 Frequency from NUREG-1434.	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.
16.2-67	Hearn P	Explain omission of TS 5.2.2 Reviewer's Note from the proposed TS.	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-68	Hearn P	Justify exclusion of Post Accident Sampling from TS 5.0.	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.
16.2-69	Hearn P	Explain extension limit on SR 3.0.2 for valves in the ISI Program.	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.
16.2-70	Hearn P	Justify excluding Liquid Leakage methodology from the TS 5.5.6.	Justify excluding the methodology for determining Liquid Leakage from the explosive gas monitoring program in the proposed ESBWR TS 5.5.6.
16.2-71	Hearn P	Justify excluding the surveillance program for outdoor liquid radwaste tanks, from TS 5.5.6.	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.
16.2-72	Harbuck C	Clarify meaning of Note 1 in TS 3.3.3.1 Actions section.	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?"

RAI Number	Reviewer	RAI Summary	RAI
16.2-73	Jones S	Provide justification for limiting the applicability of GDCS injection operability	DCD 16B, TS 3.5.3 states that, in MODES 5 and 6, GDCS is used to provide additional water inventory inside the containment to respond to a loss of decay heat removal capability or a loss of reactor coolant inventory. The Applicability basis states that operability in mode 6 is not required when the new fuel pool gate is removed and water level is above the specified level over the top of the reactor pressure vessel flange because of the additional inventory available when in this configuration. However, this inventory is not protected in that it may be lost through various paths including failure of the non-seismic and non-safety refueling seal or fuel transfer system. The Bases for the Residual Heat Removal-High Water Level TS in NUREG-1434, under Actions, describe that the residual heat removal system provides reliable heat removal for loss of cooling water inventory conditions initiating from the high water level conditions. However, the proposed ESBWR Bases for TS 3.5.5 states that RWCU/SDC is a non-safety-related system [that cannot be assumed to remain available following an equipment failure or a loss of offsite power] and that, once the reactor vessel head is removed, loss of the normal decay heat removal method could result in boiling in the vessel. The ESBWR Bases go on to state that water in the GDCS pools is a source of reactor coolant inventory for this mode of decay heat removal. Provide justification for limiting the applicability of GDCS injection operability to operational Mode 6, “refueling,” with water level less than 23 feet above the reactor vessel flange.

RAI Number	Reviewer	RAI Summary	RAI
16.2-74	Jones S	Provide basis for not including an operability requirement for a decay heat removal method in the refueling mode with the head fully detensioned or removed.	DCD Tier 2, Rev. 1, Chapter 16, TS 3.5.5 states that use of the ICS as an emergency backup for decay heat removal in MODE 6 requires the reactor vessel head to be in place. Once the reactor vessel head is removed, loss of the normal decay heat removal method could result in boiling in the vessel. NUREG-1434, Rev. 3.1, specifies one or more heat removal paths operable, depending on water level, and one in operation. If the operating loop fails, an alternate residual heat removal loop must be placed in operation. If no alternate heat removal path is available at high water level, the required action specifies operation of the standby gas treatment system and establishment of secondary containment. Provide the basis for not including an Operability requirement for a decay heat removal method in the refueling mode with the head fully detensioned or removed. Since the basis for TS 3.5.5 describes boiling within the vessel, describe how the heat would be transferred to an ultimate heat sink, and how the potential effects of boiling would be managed.

RAI Number	Reviewer	RAI Summary	RAI
16.2-76	Jones S	Describe how an adequate spent fuel water level is included in LCO as a parameter satisfying Criterion 2 of 10 CFR 50.36.	DCD Tier 2, Rev. 1, Section 9.1.2.7, states that on a complete loss of the FAPCS active cooling capability and under the condition of maximum heat load, sufficient quantity of water is available in the Spent Fuel Pool above the top of active fuel (TAF) level to allow boiling for 72 hours and still have the TAF at least 3.0 m (10 ft) submerged under water. The water level necessary to provide this heat removal capacity constitutes an initial condition of a transient analysis for a loss of forced cooling. The loss of inventory presents a challenge to a fission product barrier in that water cooling is necessary to assure protection of the fuel cladding. Describe how the water level necessary to satisfy this transient analysis is included in a Limiting Condition for Operation consistent with the requirements of 10 CFR 50.36(c)(2)(ii), Criterion 2.
16.2-77	Jones S	Describe how the spent fuel makeup water system is included in the LCOs as a system satisfying Criterion 3 of 10 CFR 50.36.	The reactor building buffer pool is subject to rapid coolant inventory loss when fuel transfer gates are removed through failure of the non-seismic refueling seal around the reactor vessel or failure of the inclined fuel transfer system interlocks. This rapid coolant loss presents a challenge to the integrity of a fission product barrier in that water cooling is necessary to assure protection of the fuel cladding. Makeup water is part of the primary success path for prevention of fuel cladding damage for loss of coolant inventory events. Describe how a spent fuel makeup water system is included in a Limiting Condition for Operation as a system satisfying Criterion 3 of 10 CFR 50.36(c)(2)(ii).

RAI Number	Reviewer	RAI Summary	RAI
16.2-78	Jones S	Describe surveillance testing (including inservice testing) and associated Actions that would apply to the valves in the makeup water transfer line.	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.

RAI Number	Reviewer	RAI Summary	RAI
16.2-79	Jones S	Clarify the function of FP system as a source of makeup, relative to operability of the IC/PCCS pool.	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.
16.2-80	Jones S	Provide descriptive information regarding the minimum elevation used for drainage prevention features.	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.

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