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Subject: **Response to NRC Request for Additional Information Letter No. 48 Related to ESBWR Design Certification Application – Technical Specifications – RAI Numbers 16.2-1 through 16.2-9 and 16.2-26 through 16.2-29**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter. This completes GE's response to RAI Letter No. 48.

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 06-272, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 48 Related to ESBWR Design Certification Application,* August 3, 2006

Enclosure:

1. MFN 06-285 – Response to NRC Request for Additional Information Letter No. 48 Related to ESBWR Design Certification Application – Technical Specifications – RAI Numbers 16.2-1 through 16.2-9 and 16.2-26 through 16.2-29

cc:

WD Beckner	USNRC (w/o enclosures)
AE Cubbage	USNRC (with enclosures)
LA Dudes	USNRC (w/o enclosures)
GB Stramback	GE/San Jose (with enclosures)
eDRFs	0055-8752, 0056-2887, 0056-2897

Enclosure 1

MFN 06-285

Response to NRC Request for Additional Information

Letter No. 48 Related to ESBWR Design Certification Application

Technical Specifications

RAI Numbers 16.2-1 through 16.2-9

and 16.2-26 through 16.2-29

NRC RAI 16.2-1

Since the issuance of RG 1.45 in 1973, fuel performance has improved (i.e., failed fuel is much less likely to occur) thus greatly diminishing the value of monitoring gaseous radioactivity for leakage detection purposes. Based on the experiences of operating reactors, the gaseous radiation monitor, which was originally designed to detect reactor coolant system (RCS) leakage of 1 gpm within one hour may take much longer time than one hour to detect 1 gpm leakage. NRC Information Notice 2005-24 indicated that the reactor coolant activity assumptions used for operating reactors for containment radiation gaseous monitors might be non-conservative.

In DCD Section 11.5.3.2.12, it is indicated that the gaseous radiation monitor is able to detect 1 gpm within one hour. In addition, ESBWR TS LCO 3.3.4.1(b) requires one channel of the drywell fission product monitoring system be operable. It enters Action B.1 only if both drywell fission product monitoring channels (gaseous and particulate) inoperable.

RG 1.45 states that "it is important to be able to associate a signal or indication of a change in the normal operating conditions with a quantitative leakage flow rate. Except for flow rate or level change measurements from tanks, sumps, or pumps, signals from other leakage detection systems do not provide information readily convertible to a common denominator. Approximate relationships converting these signals to units of water flow should be formulated to assist the operator in interpreting signals. Since operating conditions may influence some of the conversion procedures, the procedures should be revised during such periods." Please provide the "approximate relationships" used for correlating ESBWR radiation monitor signals to leakage flow rates.

Demonstrate that ESBWR gaseous channel of the drywell fission product radiation monitor is able to detect one gpm within one hour by assuming a "realistic primary coolant radioactivity concentration." What is the fuel failure assumption for the primary coolant radioactivity concentration? Justify the validity of this assumption.

GE Response

a) The "approximate relationships" used for correlating ESBWR radiation monitor signals to leakage flow rates requested in this RAI are dependent upon several factors. Among these factors is the capability of the specific instrument purchased to detect the radioactivity concentration. The specific instrument that will be used in the ESBWR has not been identified at this stage of the design process. Procedures are provided to the operator to convert the monitored parameter into a common leakage rate equivalent to assist in determining that the leakage rate(s) are within the technical specification limit. Specific procedures are a licensee responsibility and are not available at this time.

b) Regulatory Guide 1.45, Regulatory Position 3, requires that at least three separate detection methods should be employed and that two of these methods should be

(1) sump level and flow monitoring and (2) airborne particulate radioactivity monitoring. The third method may be selected from the following: (a) monitoring of condensate flow rate from air coolers, or (b) monitoring of airborne gaseous radioactivity.

The ESBWR complies with Regulatory Position 3 in that sump level and flow are monitored by the drywell floor drain high conductivity water (HCW) sump monitoring system, airborne particulate radioactivity is monitored by the drywell fission product monitoring system, and condensate flow rate from the air coolers is monitored by the drywell air coolers condensate flow monitoring system. GE proposes to revise TS 3.3.4.1 and its associated Bases to delete monitoring of airborne gaseous activity by the drywell fission product monitoring system as a credited method of RCS leakage detection. The revised TS 3.3.4.1 and associated Bases comply with the requirements of Regulatory Guide 1.45, Regulatory Position 3. DCD Section 11.5.3.2.12 will be revised to delete the details related to the sensitivity of the airborne gaseous radioactivity channel to detect specific amounts of RCS leakage rates.

NRC RAI 16.2-2

SR 3.4.2.1 "Verify RCS unidentified and total LEAKAGE are within limits," lists a Frequency of 12 hours. The BWR Standard Technical Specifications (STS) recommends a frequency of 8 hours. Please provide technical justification for extending the surveillance frequency to 12 hours.

GE Response

GL 88-01, Supplement 1 supplies a basis for this frequency. After GL 88-01 was issued, the staff discussed the generic letter with several BWR operators and the owner's group and concluded that the staff position on frequency contained in GL 88-01 would create an unnecessary administrative hardship for plant operators. Supplement 1 to GL 88-01 states: "*The staff found that monitoring reactor coolant system (RCS) leakage every 4 hours creates an unnecessary administrative hardship for plant operators. Thus, RCS leakage measurements should be taken at least once per shift, not to exceed 12 hours.*" Based on the above considerations, the proposed TS frequency is considered to be proper and adequate to assure plant safety; therefore, no DCD changes will be made in response to this RAI.

NRC RAI 16.2-3

LCO 3.4.2 "RCS Operational Leakage" states a limit for total leakage. The bases also states that a "Violation of this LCO indicates an unexpected amount of LEAKAGE and, therefore, could indicate new or additional degradation in an (reactor coolant pressure boundary) RCPB component or system". Please explain what instrument is used to verify that the limit for total leakage is not exceeded and why this instrument is not included in TS 3.3.4.1 as required by 10 CFR 50.36.

GE Response

RG 1.45, Regulatory Position 1, in part, requires the source of leakage to be identifiable to the extent practical. RCPB leak detection and collection systems should be selected and designed such that: 1) Leakage from identified sources should be collected or otherwise isolated so that; a) the flow rates are monitored separately from unidentified leakage; and b) the total flow rate can be established and monitored. Total leakage is merely the sum of identified and unidentified leakage. There is no specific instrument for the determination of total leakage. DCD Subsection 5.2.5 provides descriptions of the various systems provided for detection of leakage (both identified and unidentified). Systems used to identify specific leakage are not included in the TS. If a leakage rate increase is detected, this leakage is treated as unknown unless/until it can be identified. This is considered to be a conservative approach because TS 3.4.2 limits the unidentified leakage rate to 5 gpm, while limiting the total leakage rate (the sum of identified and unidentified leakage rates) to 30 gpm. This is consistent with the concept of leakage detection in NUREG 1434. Procedures are provided to the operator to convert the monitored parameter into a common leakage rate equivalent to assist in determining that the leakage rate(s) are within the technical specification limit. Specific procedures are a licensee responsibility and are not available at this time. Based on the above considerations, the proposed TS values and required actions are considered to be proper and adequate to assure plant safety; therefore, no DCD changes will be made in response to this RAI.

NRC RAI 16.2-4

LCO 3.4.2 "RCS Operational Leakage" does not list a limit for rate increases in unidentified Leakage. The BWR STS provides LCOs on increases in leakage rates. 10 CFR 50.36 requires TS on instrumentation designed to detect a significant abnormal degradation of the RCPB. Please discuss why the rate-of-change leakage TS is not provided for the ESBWR.

GE Response

ESBWR TS LCO 3.4.2 specifies limits of ≤ 5 gpm for unidentified leakage and ≤ 30 gpm for total leakage. NUREG-1434 LCO 3.4.5 specifies a limit for an increase in unidentified leakage; however, NUREG-1434 LCO 3.4.5.d is shown as bracketed in its entirety. This acknowledges that incorporation of this LCO requirement is a plant-specific issue.

GL 88-01 required licensees to confirm their plans to ensure that the Technical Specification related to leakage detection be in conformance with the staff position on leak detection included in GL 88-01. The staff position required, in part, plant shutdown within any period of 24 hours or less when any leakage detection system indicates an increase in rate of unidentified leakage in excess of 2 gpm or its equivalent. GL 88-01 applies to all BWR piping made of austenitic stainless steel that is susceptible to intergranular stress corrosion cracking (IGSCC).

NUREG 75/067 provides the basis for the rate of increase limits. This limit was found to be necessary for BWRs because their materials of construction were susceptible to intergranular stress corrosion.

The BWR evolution has continued to reduce the likelihood of leaks because of Stress Corrosion Cracking (SCC) of austenitic stainless steels by reducing and limiting the use of austenitic stainless steel, eliminating large penetrations in the lower vessel region and using SCC resistant fabrication processes. According to DCD section 3E.5, "*the ESBWR plant design specifies use of austenitic stainless steel piping made of material (e.g., nuclear grade or low carbon) that is recognized as resistant to Inter-Granular Stress Corrosion Cracking (IGSCC).*" Stainless steel piping continuously active during normal reactor operation is limited to the Reactor Water Cleanup System and the Isolation Condenser System return lines. Large penetrations in the lower vessel region have been avoided by the elimination of the external recirculation system and internal recirculation pumps and most vessel connections are above the core. Additional measures taken in the ESBWR to reduce challenges to the 5 gpm unidentified leakage limit are use of SCC resistant materials for bottom head penetrations, CRD housings and in-core housings. The 5 gpm limit for unidentified RCS operational leakage is based on the behavior of pipe cracks. It has been shown that, for leakage even greater than 5 gpm, the probability is small that the associated imperfection or crack would grow rapidly. Additionally, 5 gpm is a small fraction of the calculated flow from a critical crack in the primary

system piping. Additionally, pipe cracks are addressed in DCD Table 1.11-1. According to the resolution for Action Plan Item/Issue number A-42 in this table, the RCS piping in the ESBWR design complies with NUREG-0313, Rev. 2 and Generic Letter (GL) 88-01 through the selection of materials and processes that avoid sensitization or susceptibility to IGSCC. According to DCD Section 5.2.3.4.1, the RCS piping is designed to avoid sensitization and susceptibility to IGSCC through the use of reduced carbon content material and process controls. During fabrication, solution heat treatment is utilized. During welding, heat input is controlled. Austenitic stainless steels that have become sensitized or susceptible to cracking because of IGSCC are not used in the ESBWR design.

Historically, good operator practice plays a role in the event of an anomaly in unidentified leakage. The duties and responsibilities of the operating staff to regularly observe and record data, monitor trends in plant parameters and detect abnormal conditions during their shift provide a means to alert the plant staff to a condition that warrants further scrutiny and assessment. For example, if leakage is observed to be more than the normal expected leakage, yet less than the 5 gpm limit, the plant operators typically will be alerted to investigate, record, and track pertinent data, evaluate trends in the data and make an assessment of the cause for any change that could ultimately lead to a reactor shutdown to make a drywell entry to take further action to locate, assess and potentially repair the source of leakage. Therefore, this typical practice identifies that utilities have established measures for taking action before reaching the 5 gpm leakage limit.

Based on the above considerations, the proposed TS values and required actions are considered to be proper and adequate to assure plant safety and, therefore, a separate limit for RCS leakage rate-of-change is not required. No DCD changes will be made in response to this RAI.

NRC RAI 16.2-5

TS 3.3.4.1 "Reactor Coolant System (RCS) Leakage Detection Instrumentation", Condition A, allows the Drywell floor drain high conductivity waste (HCW) sump monitoring system to be inoperable for 30 days. Please explain how SR 3.4.2.1 "Verify RCS unidentified and total LEAKAGE are within limits" is met with the Drywell floor drain HCW sump monitoring system inoperable (i.e., How is leakage quantified?)

GE Response

This allowance is consistent with the requirements of NUREG-1434. Although three methods are specified, in accordance with RG 1.45, other methods do exist that allow determination of leakage. Supplement 1 to GL 88-01 provides additional background. "*The staff's position on leak detection in GL 88-01 requires that for BWR plants operating with any IGSCC Category D, E, F, or G welds, at least one of the leakage measurement instruments associated with each sump be operable and the outage time for inoperable instruments be limited to 24 hours. If the outage time is longer than 24 hours, the licensee should immediately initiate an orderly shutdown. The intent of this requirement is to ensure that the capability to quantitatively measure leakage is not lost for more than 24 hours because this capability is essential for safe plant operation. After discussing this position with the BWR operators, the staff found that leakage can also be quantitatively measured by manually pumping the sump or measuring the differences in sump level. Therefore, the staff finds that manual leak rate measurements can be acceptable alternatives during the period (30 days) when the drain sump monitoring system is being restored, provided the licensee demonstrates their suitability with regard to accuracy and inspectability.*" Specific procedures and methods for RCS leak detection are a licensee responsibility. GE expects that alternate methods will be developed as part of the normal procedure development process. Based on the above considerations, the proposed TS required actions are considered to be proper and adequate to assure plant safety; therefore, no DCD changes will be made in response to this RAI.

NRC RAI 16.2-6

TS 3.3.4.1 "Reactor Coolant System (RCS) Leakage Detection Instrumentation", Condition B, only lists a Required Action of "Analyze samples of drywell atmosphere" once 12 hours. The BWR STS also recommends restoring the atmospheric monitoring system to Operable status within 30 days. Please explain what would require returning the atmospheric monitoring system to Operable status.

GE Response

The requirement referred to in the RAI is a bracketed option in the BWR STS that assumes that the plant does not have another form of leak detection, such as air cooler condensate return. "*With both gaseous and particulate drywell atmospheric monitoring channels inoperable, grab samples of the drywell atmosphere shall be taken and analyzed to provide periodic leakage information. [Provided a sample is obtained and analyzed every 12 hours, the plant may be operated for up to 30 days to allow restoration of at least one of the required monitors.] [Provided a sample is obtained and analyzed every 12 hours, the plant may continue operation since at least one other form of drywell leakage detection (i.e., air cooler condensate flow rate monitor) is available.]*" Because the ESBWR does have a drywell air coolers condensate flow monitoring system, the 30-day limitation was not incorporated. In the event both the required drywell fission product monitoring system and the drywell air coolers condensate flow monitoring system are inoperable, Condition D requires restoration of one of the two required systems to operable status within 30 days. While in this condition, the requirements of Required Action B.1 would also apply. This will require that, during the 30-day period, samples of drywell atmosphere must be analyzed once per 12 hours. Based on the above considerations, the proposed TS required actions are considered to be proper and adequate to assure plant safety; therefore, no DCD changes will be made in response to this RAI.

NRC RAI 16.2-7

(A) TS 3.3.4.1 "Reactor Coolant System (RCS) Leakage Detection Instrumentation", Condition E, only lists a required action to be in Mode 3 within 12 hours. The BWR STS also recommends entering Cold Shutdown within 36 hours. Please provide technical justification for not entering Mode 5.

(B) TS 3.3.4.1 "Reactor Coolant System (RCS) Leakage Detection Instrumentation", Condition E, only lists a required action to be in Mode 3 within 12 hours for a Condition of "All required Leakage detection systems inoperable". The BWR STS recommends entering LCO 3.0.3 which requires being in a Cold Shutdown condition within 37 hours. Please provide a technical justification for not entering LCO 3.0.3 and being in Mode 5 within 37 hours when all required leakage detection systems are inoperable.

GE Response

RAI 16.2-7 requests justification for ESBWR Technical Specification (TS) required actions that allow the unit to remain in Mode 3 when requirements for reactor coolant system (RCS) leakage detection instrumentation are not met instead of progressing to Mode 5 (Cold Shutdown) as is currently required by the BWR STS. During public meetings on June 9, 2006, and June 29, 2006, GE highlighted other TS with similarly modified required actions. During these discussions, GE requested that a single RAI be developed to allow a comprehensive response to this issue. Development of a comprehensive response that discusses the basis for ESBWR TS required actions in this category would allow the best use of both GE and NRC resources for the development and review of the requested justifications. GE will include the basis for RCS leakage detection instrumentation required actions as part of the response to RAI 16.0-7.

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

NRC RAI 16.2-8

TS 3.3.4.1 "Reactor Coolant System (RCS) Leakage Detection Instrumentation" states LCO 3.0.4.c is applicable. The bases states that this is allowed since other instrumentation is normally available to monitor leakage. If this "other" instrumentation is potentially the only equipment available to monitor leakage, then it should be included in the LCO as required by 10 CFR 50.36 and the statement of "LCO 3.0.4.c is applicable" should be eliminated.

GE Response

DCD Tier 2, Section 16.3.3.4.1 will be revised in the next update to delete the Note stating that "LCO 3.0.4.c is applicable." The associated Bases discussion of the LCO 3.0.4.c Note will also be deleted.

NRC RAI 16.2-9

A review of DCD Tier 2, Section 16.5.5.1.c. (Offsite Dose Calculation Manual (ODCM)) indicates that the requirements for the submission of the ODCM is inconsistent with its stated basis document (NUREG-1434, Vol 1, Rev. 3). As written, Section 16.5.5.1.c of the DCD assumes that an ODCM already exists and that only changed portions of the ODCM specific to ESBWR design features would need to be submitted to the NRC for review. DCD Section 16.5.5.1.c should be revised to consider the possibility of an initial submission of an entirely new ODCM as the first submittal to the NRC. This change would make the commitments in this section consistent with NUREG-1434 on which Chapter 16 of the DCD is based. Update text in this section accordingly.

GE Response

ESBWR DCD Section 16.5.5.1.c states that licensee initiated changes to the ODCM "Shall be submitted to the NRC in the form of a complete, legible copy of the changed portion of the ODCM as a part of, or concurrent with, the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented."

The ESBWR Technical Specifications were developed utilizing NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6," Revision 3, to the extent practical. Although NUREG-1434 was used as a starting point, during the development of Section 16.5.5.1.c, GE elected to adopt a change approved in the AP1000 DCD. The wording proposed as DCD Section 16.5.5.1.c for the ESBWR is consistent with the wording approved for AP1000 DCD Section 16.5.5.1.c. Providing only the changed portions of the ODCM is consistent with the requirements for providing updates for other documents, such as the Final Safety Analysis Report (FSAR). Updates to the FSAR are provided to the NRC on a replacement-page basis, as stated in 10CFR50.71.e.

Technical Specifications are drafted to reflect the ongoing operation of the facility and are not the driving requirement for activities, such as the initial submittal of the entire ODCM, that are required prior to the effective date of the Technical Specifications.

In addition, the ODCM is identified as a COL Information Item in DCD subsection 11.5.7.2. Therefore, it is expected that the NRC SE for the DCD will specify that the initial submittal of the entire ODCM is a COL Action Item.

Based on the above considerations, the requirements as proposed in DCD Section 16.5.5.1.c are considered to be proper and adequate to assure plant safety; therefore, no DCD changes will be made in response to this RAI.

NRC RAI 16.2-26

Provide a list identifying each component for each instrument function tested by TS defined surveillance requirement (SR) terms: Channel Functional Test, Channel Calibration, and Logic System Functional test.

GE Response

ESBWR Technical Specifications (TS) for protection instrumentation is typically divided into two LCOs – one LCO for the sensing instruments and a second LCO that covers the logic and all output components necessary to complete the automatic function excluding the end device (e.g., the valve) which is covered by LCO governing the system or component being actuated. This format applies to reactor protection (Limiting Conditions for Operation (LCOs) 3.3.1.1 and 3.3.1.2), neutron monitoring (LCOs 3.3.1.4 and 3.3.1.5), ECCS (LCOs 3.3.5.1 and 3.3.5.2), isolation condenser (LCOs 3.3.5.3 and 3.3.5.4), MSIV closure (LCOs 3.3.6.1 and 3.3.6.2), isolation (LCOs 3.3.6.3 and 3.3.6.4), and emergency breathing air (LCOs 3.3.7.1 and 3.3.7.2).

The LCOs for the sensing instruments cover the instrument sensor, the remote multiplexer units (RMUs), and the digital trip monitor (DTMs). The LCOs for the logic and actuation for RPS and MSIV isolation cover the trip logic units (TLUs), the output logic unit (OLUs), and the load drivers (LDs). The LCOs for the logic and actuation for the ESF functions (ECCS, containment isolation, etc.) cover the voter logic units (VLUs), the output channel remote multiplexer units (RMUs), and the load drivers (LDs).

LCOs for sensing instruments require periodic Channel Checks, Channel Functional Tests and Channel Calibrations to verify Operability. LCOs for the logic and actuation devices require periodic Logic System Functional Tests to verify Operability. These tests are defined in Section 1.1 of the ESBWR Technical Specifications. The ESBWR definitions for these tests are consistent with the definitions used in NUREG-1433 for the BWR/4 and in NUREG-1434 for the BWR/6.

A Channel Functional Test includes the RMU and DTM. A Channel Calibration includes the sensor, the RMU, and DTM. A Logic System Functional Test includes the TLUs or VLUs, OLUs or output channel RMUs, the LDs, and all output components necessary to complete the automatic function excluding the end device.

DCD Tier 2, Chapter 7, Instrumentation and Control Systems, and DCD Tier 2, Chapter 16B, Section 3.3, Instrumentation, provide a more detailed description of the components in the instrumentation systems.

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

NRC RAI 16.2-27

Provide a list of safety systems that were excluded from the proposed TS by comparison to TS criteria in 50.36(c)(ii).

GE Response

The General Electric response to RAI 16.0-1 lists the safety systems that were evaluated against the criteria in 10 CFR 50.36(c)(2)(ii) but did not meet any of the criteria for inclusion in the Technical Specifications (TS). The response to RAI 16.0-1 also explains how the structures, systems, and components (SSC) were selected for evaluation. The evaluation was used to verify that Revision 1 of DCD Chapter 16, Technical Specifications, includes the Limiting Conditions for Operation (LCOs) required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. Proposed changes to the TSs resulting from this evaluation are described in the response to RAI 16.0-1.

The General Electric response to RAI 16.0-1 was submitted in Letter MFN 06-263, "Response to NRC Request for Additional Information Letter No. 24 Related to ESBWR Design Certification Application – Technical specifications for Limiting Conditions for Operation – RAI Number 16.0-1, dated August 08, 2006.

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

NRC RAI 16.2-28

Provide a list of non-safety systems that were excluded from the proposed TS by comparison to TS criteria in 50.36(c)(ii). Which of these non-safety systems have been identified for availability controls?

GE Response

The General Electric response to RAI 16.0-1 lists the non-safety systems that were evaluated against the criteria in 10 CFR 50.36(c)(2)(ii) but did not meet any of the criteria for inclusion in the Technical Specifications (TSs). The response to RAI 16.0-1 also explains how the structures, systems, and components (SSC) were selected for evaluation. The evaluation was used to verify that Revision 1 of DCD Chapter 16, Technical Specifications, includes the Limiting Conditions for Operation (LCOs) required to maintain the validity of the safety analysis and risk analysis described in Revision 1 of the ESBWR DCD. Proposed changes to the TSs resulting from this evaluation are described in the response to RAI 16.0-1.

Selection of the ESBWR process variables, design features, operating restrictions, and SSC that will be subject to availability controls has not been completed. At a minimum, those non-safety systems that were evaluated against the criteria in 10 CFR 50.36(c)(2)(ii) but did not meet any of the criteria for inclusion in the TSs will be evaluated for inclusion in the availability controls.

The General Electric response to RAI 16.0-1 was submitted in Letter MFN 06-263, "Response to NRC Request for Additional Information Letter No. 24 Related to ESBWR Design Certification Application – Technical specifications for Limiting Conditions for Operation – RAI Number 16.0-1, dated August 08, 2006.

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

NRC RAI 16.2-29

Identify the instrumentation functions that permit indefinite operation with the required actions met in accordance with LCO 3.0.4.

GE Response

LCO 3.0.4.a allows entry into a Mode or other specified condition in the Applicability when an LCO is not met if "the associated Actions to be entered permit continued operation in the Mode or other specified condition in the Applicability for an unlimited period of time."

The ESBWR Technical Specifications do not allow an individual channel of a protection function to be placed in trip or bypass except for neutron monitoring system channels. If the appropriate compensatory action for an inoperable instrument function channel is to place the channel in trip or bypass, Technical Specifications (TSs) require that the instrumentation division (e.g., the division of sensors) be placed in trip or bypass. Therefore, as described below, the allowance provided by LCO 3.0.4.a applies to divisions of instrument functions and not individual instrument functions.

ESBWR instrumentation systems for reactor protection (Limiting Conditions for Operation (LCOs) 3.3.1.1 and 3.3.1.2), neutron monitoring (LCO 3.3.1.4), isolation condenser system instrumentation (LCO 3.3.5.3), MSIV isolation (LCOs 3.3.6.1 and 3.3.6.2), isolation instrumentation (LCO 3.3.6.3), and emergency air breathing instrumentation (LCO 3.3.7.1) consist of four divisions of sensors and four divisions of actuation logic and components with the sensors and actuation logic covered by separate LCOs. The allowance provided by LCO 3.0.4.a is applied as follows:

(a) When one channel of one or more instrument functions in a single division or a division of actuation logic is inoperable, Actions require that the associated division of sensors or actuation division be placed in either trip or bypass. Operation in this condition can continue for an unlimited period of time. This is acceptable because the protection functions can still be performed in the presence of a random failure of any single channel or division when one division is placed in either bypass or trip. Therefore, the allowance provided by LCO 3.0.4.a allowing Mode changes with one division of sensors and/or division of actuation logic in trip or bypass is applicable.

(b) When one channel of one or more instrument functions in two divisions or two divisions of actuation logic are inoperable, Actions require that one of the divisions be placed in trip and that the other division be placed in bypass. Operation in this condition can continue for an unlimited period of time. This is acceptable because the protection functions can still be performed in the presence of a random failure of any single channel or division when one division is in trip and a second division is in bypass. Therefore, the allowance provided by LCO 3.0.4.a allowing Mode

changes with one division of sensors and/or actuation logic in trip and one division of sensors and/or actuation logic in bypass is applicable.

ESBWR instrumentation systems for ECCS (LCO 3.3.5.1) also consist of four independent divisions with a design similar to that described above. However, LCO 3.3.5.1 allows inoperable instruments in only one division of sensors and requires that the division of sensors be placed in bypass to avoid an increased potential for inadvertent ECCS actuation. In this configuration, the ECCS can still perform its safety function in the presence of a random single failure of any channel. Operation in this condition can continue for an unlimited period of time. Therefore, the allowance provided by LCO 3.0.4.a allowing Mode changes with one division of sensors in bypass is applicable.

ESBWR actuation logic for isolation (LCO 3.3.6.4) also consists of four independent divisions with a design similar to that described above. However, LCO 3.3.6.4 allows inoperable instruments in only one division of actuation logic and requires that the inoperable actuation division be place in trip so that single failure tolerance for the actuated device is maintained. Operation in this condition can continue for an unlimited period of time. Therefore, the allowance provided by LCO 3.0.4.a allowing Mode changes with one division of actuation logic in trip is applicable.

LCO 3.3.4.1 for RCS Leakage Detection instrumentation requires periodic sampling of the drywell atmosphere when the drywell fission product monitoring instruments are inoperable. Operation in this condition can continue for an unlimited period of time since at least one other form of drywell leak detection is available. Therefore, the allowance provided by LCO 3.0.4.a allowing Mode changes with inoperable drywell fission product monitors is applicable.

LCO 3.0.4.a is not applicable to the LCOs that do not allow operation for an unlimited period of time with inoperable instrument functions. This category of instruments includes the following: LCO 3.3.1.3, Reactor Protection System Manual Trip Actuation; LCO 3.3.1.5, Neutron Monitoring System Automatic Actuation; LCO 3.3.1.6, Startup Range Neutron Monitor – Shutdown; LCO 3.3.2.1, Control Rod Block Instrumentation; LCO 3.3.3.1, Post-Accident Monitoring (PAM) Instrumentation; LCO 3.3.3.2, Remote Shutdown System Instrumentation; LCO 3.3.5.2, ECCS Actuation; LCO 3.3.5.4, Isolation Condenser System Actuation; and, LCO 3.3.7.2, EBAS Actuation.

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