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Subject: **Changes to ESBWR DCD Chapters 16 and 16B Related to GEH Internal Corrective Actions**

The purpose of this letter is to submit markups identifying changes to ESBWR DCD Chapters 16 and 16B, which are the result of GEH internal review.

Change lists and the markups for Chapters 16 and 16B are provided in Enclosure 1. Changes not previously submitted are boxed on the change lists and markups. The changes identified on these markups will be incorporated into ESBWR DCD Revision 7.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Enclosure:

1. ESBWR DCD, Chapters 16 and 16B Change Lists and Markups

cc:

	AE Cubbage	USNRC (with enclosure)
	JG Head	GEH (with enclosure)
	DH Hinds	GEH (with enclosure)
	JD Friday	GEH (with enclosure)
	eDRFSections	112-0767, 112-3888

Enclosure 1

MFN 10-072

ESBWR DCD, Chapters 16 and 16B

Change Lists and Markups

ESBWR DCD Chapter 16

26A6642BR Revision 6 to Revision 7 Change List

Item	Location	Description of Change
1	16.00, Table 16.0-1-A	Deleted COL item 3.3.3.2-1 in accordance with RAI 16.2-190 (MFN 09-665).
2	16.00, Table 16.0-1-A	Deleted COL item 5.6.5-1 in accordance with RAI 16.2-190 (MFN 09-665).
3	16.03.03.03.02	Updated PAM specification in accordance with RAI 16.2-190 (MFN 09-665).
4	16.03.06.03.01, SR 3.6.3.1.5	Revised SR Frequency from “60 Months” to “24 Months” in accordance with RAI 16.2-50 S02 (MFN 09-638).
5	16.03.07.01	Updated specification in accordance with RAI 16.2-189 (MFN 09-672).
6	16.04.03.01	Changed the value of k-infinity in Specifications 4.3.1.1.a and 4.3.1.2.a from 1.35 to 1.32; and deleted “beginning-of-life (BOL)” in Specification 4.3.1.2.a in accordance with RAI 9.1-129 (MFN 09-723).
7	16.04.03.01.02	Added Specification 4.3.1.2.c to describe storage spacing of new fuel assemblies in accordance with RAI 9.1-129 (MFN 09-723).
8	16.05.05.06	Changed “Branch Technical Position (BTP) ETSB 11-5,” to “Branch Technical Position (BTP) 11-5,” and also revised the title to be consistent with the Revision 3 – March 2007 version of this BTP. The DCD Chapter 16 markup reflecting this change was submitted in MFN 10-072.
9	16.05.05.11.b	Changed title for LTR NEDE-33304P from “GEH ABWR/ESBWR Setpoint Methodology” to “GEH ESBWR Setpoint Methodology” in accordance with RAI 7.1-141 (MFN 09-775).
10	16.05.05.12.e	Added the words “less the amount designated for ingress and egress” after “DBA consequences” in the 3rd sentence in accordance with RAI 6.4-22 S01 (MFN 09-759 Supp 1).
11	16.05.05.14	Added PAM Instrumentation Program in accordance with RAI 16.2-190 (MFN 09-665).
12	16.05.06.03.b, Reference 7	Reference for NEDE-33083 Supplement 3 was updated to indicate latest revision submitted in MFN 09-589. The DCD Chapter 16 markup reflecting this reference update was submitted in MFN 10-072.
13	16.05.06.05	Revised Post-Accident Monitoring Report in accordance with RAI 16.2-190 (MFN 09-665).

5.5 Programs and Manuals

5.5.6 Explosive Gas and[Storage Tank] Radioactivity Monitoring Program

COL 16.0-1-A 5.5.6-1

This program provides controls for potentially explosive gas mixtures contained in the offgas treatment system and for the quantity of radioactivity 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 Releases ~~d~~Due to a 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."]

COL 16.0-1-A 5.5.6-1

The program shall include:

a. The limits for concentrations of hydrogen and oxygen in the offgas treatment system and a surveillance program to ensure the limits are maintained. Such limits shall be appropriate to the system's design criteria (i.e., whether or not the system is designed to withstand a hydrogen explosion);

b. A surveillance program to ensure that the quantity of radioactivity fed into the offgas treatment system is less than the amount that would result in a whole body exposure of ≥ 5 mSv (0.5 rem) to any individual in an unrestricted area, in the event of an uncontrolled release; and

[c. 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 Waste Management 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.]

COL 16.0-1-A 5.5.6-1

COL 16.0-1-A 5.5.6-1

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Explosive Gas and[Storage Tank] Radioactivity Monitoring Program surveillance frequencies.

5.6 Reporting Requirements

5.6.3 CORE OPERATING LIMITS REPORT (COLR) (continued)

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. MFN-036-85, C. O. Thomas (NRC) to J. S. Charnley (GE), Acceptance for Referencing of Licensing Topical Report NEDE-24011-P Amendment 7 to Revision 6, GE Standard Application for Reactor Fuel, March 1, 1985.

2. MFN-170-84, J. S. Charnley (GE) to R. Lobel (NRC), Fuel Property and Performance Model Revisions (Special Report MFN-170-84-0), December 14, 1984.

3. MFN-027-86, J. S. Charnley (GE) to G. C. Lainas (NRC), Special Report MFN-170-84-1 (Revision 1 to MFN-170-84-0), Fuel Property and Performance Model Revisions, April 7, 1986.

4. MFN-056-87, J. S. Charnley (GE) to M. W. Hodges (NRC), Revision 2 to Special Report MFN-170-84-0, Fuel Property and Performance Model Revisions, July 23, 1987.

5. MFN-037-98, G. A. Watford (GE) to J. H. Wilson (NRC), Completion of Program to Confirm Elevated Concentration Gadolinia Fuel Performance Prediction Capability, September 8, 1998.

6. MFN-031-99, G. A. Watford (GE) to S. Dembek (NRC), Fuel Property and Performance Model Revisions, August 20, 1999.

7. NEDE-33083P, Supplement 3, "TRACG Application for ESBWR Transient Analysis," ~~December 2007~~Revision 1, September 2009.

8. NEDO-33338, "ESBWR Feedwater Temperature Operating Domain Transient and Accident Analysis," Revision 1, May 2009.

9. Chapter 4, "Reactor," Appendix 4D, "Stability Evaluation," Section 4D.3.2.2.

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

ESBWR DCD Chapter 16B

26A6642BT Revision 6 to Revision 7 Change List

Item	Location	Description of Change
1	16B.02.01.01, Reference 2	Changed Reference 2 from NEDC-32851P-A to NEDC-33237P in accordance with RAI 16.2-191 (MFN 09-766).
2	16B.03.03.03.02	Updated PAM specification bases in accordance with RAI 16.2-190 (MFN 09-665).
3	16B.03.03.03.02, References	Revised title for Reference 1, consistent with the title for Revision 4 of Regulatory Guide 1.97. The DCD Chapter 16B markup reflecting this change was submitted in MFN 10-072.
4	16B.03.03.05.01, SR 3.3.5.1.2	Deleted language that credited the self-diagnostic design feature to help justify the SR frequency in accordance with RAI 16.2-145 Supplement 2 (MFN 09-519).
5	16B.03.03.06.01, Function 3. Main Steam Line Pressure - Low	Changed “55°C/hr” to “55.6°C/hr” to provide significant figures, consistent with the other occurrences throughout the DCD. Minor editorial changes to the surrounding text are also included. The DCD Chapter 16B markup reflecting this change was submitted in MFN 10-072.
6	16B.03.03.08.01, Background	Revised description of IC/PCCS pool cross-connect valves in accordance with RAI 16.2-189 (MFN 09-672) and RAI 19.5-21 (MFN-09-791).
7	16B.03.04.04, References	Changed Reference 3 from “ASTM E 185-02” to “ASTM E 185-82,” consistent with DCD Subsection 5.3.1.5 and 10 CFR 50, Appendix H. The DCD Chapter 16B markup reflecting this change was submitted in MFN 10-072.
8	16B.03.06.03.01, SR 3.6.3.1.5	Revised SR Frequency from “60 Months” to “24 Months” in accordance with RAI 16.2-50 S02 (MFN 09-638).
9	16B.03.07.01, Background, LCO, Actions, and SRs	Revised in accordance with RAI 16.2-189 (MFN-09-672) and RAI 19.5-21 (MFN-09-791).

BASES

SR 3.3.3.2.2

A CHANNEL CALIBRATION is performed at every 24 months for each required channel. CHANNEL CALIBRATION is a complete check of the instrument loop including the sensor. The test verifies that the channel responds to measured parameter with the necessary range and accuracy. The Frequency is based on operating experience and consistency with the typical industry refueling cycles.

REFERENCES

1. Regulatory Guide 1.97, "~~Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident~~Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," Revision 4, June 2006.

~~2. Section 7.5.~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Reactor Vessel Water Level - Low, Level 1 Allowable Value was chosen to be the same as the Automatic Depressurization Reactor Vessel Water Level - Low, Level 1 Allowable Value.

3. Main Steam Line Pressure - Low

Low main steam line pressure indicates that there may be a problem with the turbine pressure regulation that could result in ~~a condition that~~ the Reactor Pressure Vessel (RPV) ~~is~~ cooling down more than 55.6°C/hr (100°F/hr) if the pressure loss is allowed to continue. The Main Steam Line Pressure - Low Function is directly assumed in the analysis of the pressure regulator failure (Ref. 5). For this event the closure of the MSIVs and MSL drain isolation valves ensures that the RPV temperature change limit of 55.6°C/hr (100°F/hr) is not reached.

The main steam line low-pressure signals are initiated from four sensors that sense the pressure downstream of the outboard MSIVs. The sensors are arranged such that, even though physically separated from each other, each sensor is able to detect low main steam line pressure. Three channels of Main Steam Line Pressure - Low Function are required to be OPERABLE to ensure no single instrument failure can preclude the isolation function. The Allowable Value was selected to be high enough to prevent excessive RPV depressurization.

The Main Steam Line Pressure - Low Function is only required to be OPERABLE in MODE 1 since this is when the assumed transient can occur (Ref. 5).

4. Main Steam Line Flow - High (per Steam Line)

Main Steam Line Flow - High is provided to detect a break of the main steam line (MSL) and to initiate closure of the MSIVs and MSL drain isolation valves. If the steam were allowed to continue flowing out the break, the reactor would depressurize and the core could uncover. If the RPV water level decreases too far, fuel damage could occur. Therefore, the isolation is initiated on high flow to prevent or minimize core damage. The Main Steam Line Flow - High Function is directly assumed in the analysis of the MSL break (Ref. 6). The isolation action, along with the scram function of the RPS and the operation of the ECCS and Safety Relief Valves assures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46 and offsite dose limits.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.4.2

A separate limit is used when the reactor is approaching criticality. Consequently, the RCS pressure and temperature must be verified within the appropriate limits before withdrawing control rods that will make the reactor critical.

Performing the Surveillance within 15 minutes before control rod withdrawal for the purpose of achieving criticality provides adequate assurance that the limits will not be exceeded between the time of the Surveillance and the time of the control rod withdrawal.

SR 3.4.4.3, SR 3.4.4.4, and SR 3.4.4.5

Limits on the reactor vessel flange and head flange temperatures are generally bounded by the other P/T limits during system heatup and cooldown. However, operations approaching MODE 5 and MODE 6 and in MODE 5 with RCS temperature less than or equal to certain specified values require assurance that these temperatures meet the LCO limits.

COL 16.0-1-A 3.4.4-1

COL 16.0-1-A 3.4.4-2

The flange temperatures must be verified to be above the limits 30 minutes before and while tensioning the vessel head bolting studs to ensure that once the head is tensioned the limits are satisfied. When in MODE 5 with RCS temperature ≤ [26.7°C (80°F)], 30-minute checks of the flange temperatures are required because of the reduced margin to the limits. When in MODE 5 with RCS temperature ≤ [37.8°C (100°F)], monitoring of the flange temperature is required every 12 hours to ensure the temperatures are within the limits specified in [the PTLR].

The 30-minute Frequency reflects the urgency of maintaining the temperatures within limits, and also limits the time that the temperature limits could be exceeded. The 12-hour Frequency is reasonable based on the rate of temperature change possible at these temperatures.

REFERENCES

1. 10 CFR 50, Appendix G.
2. ASME, Boiler and Pressure Vessel Code, Section III, Appendix G.
3. ASTM E 185-~~0~~82.
4. 10 CFR 50, Appendix H.