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MFN 10-281

Docket No. 52-010

October 1, 2010

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Transmittal of ESBWR DCD Tier 2, Chapter 1 and Appendix 3H Markups Related to GEH Internal Corrective Action**

The purpose of this letter is to submit markups to the ESBWR DCD, Tier 2, Chapter 1 and Appendix 3H, which are the result of GEH internal review. These markups will be incorporated into the DCD, Revision 8. The markup pages are contained in Enclosure 1. Changes associated with these corrective actions are enclosed within boxes on the markup pages. The changes are summarized below.

Affected Section	Description of Change
Table 1.6-1, NEDE-33536P and NEDO-33536	Updated revision level from Revision 0 (December 2009) to Revision 1 (October 2010).
Section 3H.4, Reference 3H.4-8	Updated revision level of NEDE-33536P and NEDO-33536 from Revision 0 (December 2009) to Revision 1 (October 2010).
Table 3H-3, row beginning "Div 1, 2, 2 and 4 electrical penetration rooms...", applying to rooms 1312, 1322, 1332, 1342	Changed "Div 1, 2, 2 and 4..." to "Div 1, 2, 3 and 4...".
Table 3H-12, column "Rooms", row "1100, 1101, 1102, 1103..."	Deleted rooms 1100 and 1102 from this cell.
Table 3H-12, new row below row "1100, 1101, 1102, 1103..."	Added row to provide information for rooms 1100 and 1102, which contain safety-related equipment.
Table 3H-12, new note (5)	Added a note applying to safety-related equipment in rooms 1100 and 1102.

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Affected Section	Description of Change
Table 3H-15, row beginning "Div 1, 2, 2 and 4 electrical penetration rooms...", applying to rooms 1312, 1322, 1332, 1342	Changed "Div 1, 2, 2 and 4..." to "Div 1, 2, 3 and 4...".
Table 3H-15, row beginning "Div 1, 2, 3 and 4...", applying to rooms 1610, 1620, 1630, 1640, column "72 hrs"	Corrected temperature from 59°C (138° F) to 62°C (144° F).

If you have any questions or require additional information, please contact me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

Enclosure:

1. Transmittal of ESBWR DCD Tier 2, Chapter 1 and Appendix 3H Markups Related to GEH Internal Corrective Action – DCD Markups

cc: AE Cubbage USNRC (with enclosure)
JG Head GEH/Wilmington (with enclosure)
DH Hinds GEH/Wilmington (with enclosure)
TL Enfinger GEH/Wilmington (with enclosure)
SR Andersen GEH/Wilmington (with enclosure)
eDRF Section 0000-0110-2945, Revision 1

Enclosure 1

MFN 10-281

Transmittal of ESBWR DCD Tier 2, Chapter 1 and Appendix 3H Markups Related to GEH Internal Corrective Action

DCD Markups

Table 1.6-1

Referenced GE / GEH Reports

Report No.	Title	Section No.
NEDE-33516P	[*GE Hitachi Nuclear Energy, "ESBWR Qualification Plan Requirements for a 72-Hour Duty Cycle Battery," NEDE-33516P, Class III (Proprietary), Revision 2, December 2009.*]*	3.11
NEDE-33536P NEDO-33536	[*GE Hitachi Nuclear Energy, "Control Building and Reactor Building Environmental Temperature Analysis for ESBWR," NEDE-33536P, Class III (Proprietary), Revision ~~0~~1, ~~Decem~~October 2010~~9~~, NEDO-33536, Class I (Non-proprietary), Revision ~~0~~1, ~~Decem~~October 2010~~9~~.*]*	3H
NEDE-33564P NEDO-33564	GE Hitachi Nuclear Energy, "Leakage Detection Instrumentation Confirmatory Test for the ESBWR Wetwell-Drywell Vacuum Breakers," NEDE-33564P, Class II (Proprietary), Revision 0, March 2010; NEDO-33564, Revision 0, Class I (Non-proprietary), March 2010.	6.2
NEDE-33572P NEDO-33572	GE Hitachi Nuclear Energy, "ESBWR ICS and PCCS Condenser Combustible Gas Mitigation and Structural Evaluation," NEDE-33572P, Class II (Proprietary), Revision ~~0~~1~~3~~, ~~Marchy~~ September 2010; NEDO-33572, Revision ~~0~~1~~3~~, Class I (Non-proprietary), ~~Marchy~~September 2010.	3G.1, 3.8, 5.4, 6.2

* References that are bracketed and italicized with an asterisk following the brackets are designated as Tier 2*. Prior NRC approval is required to change Tier 2* information.

3H.3.4 Locations of Safety-Related Equipment

Table 3H-12 identifies the potential location for safety-related equipment assumed for each room or set of rooms and the evaluated heat load capacity. This table also contains the evaluated heat load for nonsafety-related rooms, because nonsafety-related equipment is conservatively assumed to continue to be powered by nonsafety-related batteries during the first 2 hours of LOOP and thus contributes to the room heat up during LOOP and a DBA. The EQ program confirms equipment locations and heat loads do not cause temperatures to exceed the specified acceptance criteria.

3H.3.5 Mild Environment Conditions

The environment parameter limits that constitute mild environment conditions are identified in Table 3H-13.

3H.3.6 Combined License (COL) Information

None.

3H.4 REFERENCES

3H.4-1 10 CFR 50 Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors."

3H.4-2 NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants," February 1995.

3H.4-3 Not used.

3H.4-4 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena."

3H.4-5 10 CFR Part 50, Appendix A, General Design Criterion 4, "Environmental and Dynamic Effects Design Bases."

3H.4-6 10 CFR Part 50, 50.49, "Environmental Qualification of Electric Equipment Important to Safety of Nuclear Power Plants."

3H.4-7 Regulatory Guide 1.209, "Guidelines for Environmental Qualification of Safety-Related Computer-Based Instrumentation and Control Systems in Nuclear Power Plants."

3H.4-8 [*GE-Hitachi Nuclear Energy, "Control Building and Reactor Building Environmental Temperature Analysis for ESBWR," NEDE-33536P, Class III (Proprietary), Revision ~~0~~1, ~~Decembe~~October 20~~10~~09, NEDO-33536, Class I (Non-proprietary), Revision ~~1~~0, ~~Decee~~Octo~~m~~ber 20~~10~~09.*]*

The reference that is bracketed and italicized with an asterisk following the brackets is designated as Tier 2. Prior NRC approval is required to change Tier 2* information.

Table 3H-3

Thermodynamic Environment Conditions Inside Reactor Building for Normal Operating Conditions

Plant Zone/Typical Equipment	Pressure[1]	Temperature °C (°F)	Relative Humidity
Hydraulic Control Unit (HCU) Rooms HCU, Reactor Protection System (RPS) solenoids and RPV water level instrument racks Room Nos 1110, 1120, 1130, 1140 (Figure 1.2-1)	Negative Pressure	29 (85) Max 18 (65) Min	Not controlled
Battery Rooms Div 1, 2, 3 and 4 batteries Room Nos 1210, 1220, 1230, 1240 (Figure 1.2-2)	Negative Pressure	29 (85) Max 18 (65) Min	Not controlled
Div 1, 2, 3 and 4 commodity chases Electrical cables Room Nos 1211, 1221, 1231, 1241 (Figure 1.2-2)	Positive Pressure	40 (104) Max 10 (50) Min	Not controlled
Electrical Division Rooms Div 1, 2, 3 and 4 electrical and electronic equipment Room Nos 1311, 1321, 1331, 1341 (Figure 1.2-3)	Positive Pressure	29 (85) Max 18 (65) Min	Not controlled
Lower drywell non-divisional electrical and mechanical penetration Outboard containment isolation valves Room Nos 1300, 1301, 1302, 1303 (Figure 1.2-3)	Positive Pressure	40 (104) Max 10 (50) Min	Not controlled
Div 1, 2, ~~2~~3 and 4 electrical penetration rooms Electrical cables and penetrations Room Nos 1312, 1322, 1332, 1342 (Figure 1.2-3)	Positive Pressure	40 (104) Max 10 (50) Min	Not controlled
Remote shutdown panel Room Nos 1313, 1323 (inside rooms 1311 and 1321) (Figure 1.2-3)	Positive Pressure	29 (85) Max 18 (65) Min	Not controlled
Non-divisional electrical equipment Safety-related DCIS panels Room Nos 1500, 1501, 1502, 1503 (Figure 1.2-5)	Positive Pressure	29 (85) Max 18 (65) Min	Not controlled

Table 3H-12

Room Heat Loads

Rooms[4]	Contain safety-related equipment	Heat Load W (BTU/h)[1]			Remarks
		0 – 2 hr	2 – 24 hr	24 – 72 hr	
1110, 1120, 1130, 1140	Yes	2300 (7848)	2300 (7848)	2300 (7848)	
~~1100,~~ 1101, ~~1102,~~ 1103, 1150, 1151, 1152, 1160, 1161, 1162, 1195	No	1800 (6142) HELB	HELB	HELB	Heat load for LOCA with station blackout (SBO) scenario. Rooms bounded by HELB conditions, see Section 6.2
1100, 1102	Yes[5]	1800 (6142) HELB	HELB	HELB	Heat load for LOCA with station blackout (SBO) scenario. Rooms bounded by HELB conditions see Section 6.2
~~1106, 1107, 1196,~~ 1197, 1198	No	Negligible	0	0	~~No heat load and no heat sink~~ (conservative assumption)
1250, 1251, 1252, 1260, 1261, 1262, 1293, 1294, 1295, 1296	No	1800 (6142) HELB	HELB	HELB	Heat load for LOCA with SBO scenario. Rooms bounded by HELB conditions, see Section 6.2
1210, 1220, 1230, 1240	Yes	7200 (24567)	6000 (20473)	6000 (20473)	
1211, 1221, 1231, 1241	Yes	500 (1706)	500 (1706)	500 (1706)	
1203, 1204	No	Negligible	0	0	No heat load and no heat sink (conservative assumption)
1311, 1321, 1331, 1341	Yes	10140 (34599)	8140 (27774)	8140 (27774)	
1304, 1305, 1306, 1307, 1308	No	HELB	HELB	HELB	Rooms bounded by HELB conditions, see Section 6.2
1300, 1301, 1302, 1303	Yes	1700/500 (5800/1706)	1700/500 (5800/1706)	1700/500 (5800/1706)	The higher heat load applies to the rooms in which the RWCU/SDC piping is located.
1312, 1322, 1332, 1342	Yes	500 (1706)	500 (1706)	500 (1706)	
1313, 1323	Yes	500 (1706)	500 (1706)	500 (1706)	
1400, 1401, 1402, 1403	No	5500 (18767)	0	0	
1500, 1501, 1502, 1503	Yes	17500 (59712)	2000 (6824)	2000 (6824)	
1600/1601	No	150 (512)/150 (512)	0	0	Rooms 1600 and 1601 are considered to be the same room in the analysis.
1610, 1620, 1630, 1640	Yes	500 (1706)	500 (1706)	500 (1706)	
1710, 1720, 1730, 1740	Yes	3450/2250 (11772/7677)	3450/2250 (11772/7677)	3450/2250 (11772/7677)	The higher heat load applies to the rooms in which the RWCU/SDC piping is located.
1711, 1721, 1731, 1741	Yes	500 (1706)	500 (1706)	500 (1706)	

Table 3H-12

Room Heat Loads

Rooms[4]	Contain safety-related equipment	Heat Load W (BTU/h)[1]			Remarks
		0 – 2 hr	2 – 24 hr	24 – 72 hr	
1712, 1722, 1732, 1742	Yes	1200 (4095)	1200 (4095)	1200 (4095)	
1713, 1723	Yes	200 (682)	200 (682)	200 (682)	
1770	Yes	HELB	HELB	HELB	Room bounded by HELB conditions, see Section 6.2
18P3A/B/C/D, 18P4A/B/C/D/E/F, 18P5A/B/C, 18PA/B/C	Yes	HELB	HELB	HELB	Rooms bounded by HELB conditions, see Section 6.2
3110, 3120, 3130, 3140	Yes	5720 (19517)	4675 (15952)	3080 (10509)	
3100, 3101	No	0	0	0	No heat loads during a 0 - 72 hour period (heat sink)
CRHA (Outlined area on Figure 3H-1)	Yes	9630 (32859)	9630 (32859)	9630 (32859)	240 l/s (509 cfm)of outside air are considered (see Table 9.4-1 for minimum).[2]
(Deleted)					
3200,3203, 3277	No	0	0	0	No heat loads during a 0-72 hour period (heat sink)
3250, 3261	Yes	500 (1706)	500 (1706)	500 (1706)	
3251, 3260	No	0	0	0	No heat loads during a 0-72 hour period (heat sink)
3301, 3302	No	See Note 3	See Note 3	See Note 3	Louver for each room maintains a maximum temperature of 50°C (122°F) during LOOP. See Figures 1.2-4, 1.2-5 and 1.2-11.
3401, 3402, 3403, 3404 & corridors	No	0	0	0	No heat loads during a 0-72 hour period (heat sink)
3406, 3407	Yes	500 (1706)	500 (1706)	500 (1706)	

(1) Heat Loads provided per room except as noted.

(2) A uniform temperature distribution in the CRHA provides an adequate representation of the average bulk temperature. Heat load provided is for the overall CRHA. There is a cooling system sized to remove the nonsafety-related heat loads for two hours (See Subsection 9.4.1). However, this nonsafety-related cooling system is not credited in the analysis, and additional heat load for some nonsafety-related equipment is included for the duration of the 72-hr period.

(3) The analysis assumes that the N-DCIS rooms reach a temperature of 60°C (140°F) in the first 2 hours and remains constant for the period of interest.

(4) See Figures 1.2-1 to 1.2-8 for room locations.

(5) The safety related equipment located in these rooms performs its safety related function before a temperature increase, is not needed during a HELB event, qualified for HELB temperatures or protected against HELB environment

Table 3H-15

Analytical Room Environment Temperatures

Rooms[5]	Temperature °C (°F)			
	Normal Operation (Analytical)[1]	72 hrs	168 hrs	Max Environment Temperature from Table 3H-9
Hydraulic Control Unit (HCU) Rooms HCU, RPS solenoids and RPV water level instrument racks Room Nos 1110, 1120, 1130, 1140 Representative Room: 1130	30 (86)	44 (111)	Safe Shutdown	50 (122)
Battery Rooms Div 1, 2, 3 and 4 batteries Room Nos 1210, 1220, 1230, 1240 Representative Room: 1220	25 (77)	42 (108)	Safe Shutdown	50 (122)
Div 1, 2, 3 and 4 commodity chases Electrical cables Room Nos 1211, 1221, 1231, 1241 Representative Room: 1241	41 (106)	58 (136)	Safe Shutdown	110 (230)
Electrical Division Rooms Div 1, 2, 3 and 4 electrical and electronic equipment Room Nos 1311, 1321, 1331, 1341 Representative Room: 1341	30 (86)	47 (117)	Safe Shutdown	50 (122)
Lower drywell non-divisional electrical and mechanical penetration Outboard containment isolation valves Room Nos 1300, 1301, 1302, 1303 Representative Room: 1302	41 (106)	67 (153)	Safe Shutdown	110 (230)
Div 1, 2, ~~2~~3 and 4 electrical penetration rooms Electrical cables and penetrations Room Nos 1312, 1322, 1332, 1342 Representative Room: 1312	41 (106)	59 (138)	Safe Shutdown	110 (230)
~~Remote shutdown panel~~ Room Nos 1313, 1323 (inside rooms 1311 and 1321) Representative Room: 1323	30 (86)	45 (113)	Safe Shutdown	50 (122)
Non-divisional electrical equipment Safety-related DCIS panels Rooms Nos 1500, 1501, 1502, 1503 Representative Room: 1501	30 (86)	46 (115)	Safe Shutdown	50 (122)

Table 3H-15

Analytical Room Environment Temperatures

Rooms[5]	Temperature °C (°F)			
	Normal Operation ~~(Analytical)~~[1]	72 hrs	168 hrs	Max Environment Temperature from ~~Table 3H-9~~
Div 1, 2, 3 and 4 electrical penetrations Electrical cables and penetrations Room Nos 1610, 1620, 1630, 1640 Representative Room: 1610	41 (106)	~~59~~62 (~~138~~144)	Safe Shutdown	110 (230)
Div 1and 4 corridors rooms (access to penetration area), divisional electrical cables and safety-related DCIS RMUs Room Nos 1710, 1740 Representative Room: 1740	30 (86)	48 (118)	Safe Shutdown	50 (122)
Div 2 and 3 corridors rooms (access to penetration area), divisional electrical cables and safety-related DCIS RMUs Room Nos 1720, 1730 Representative Room: 1720	30 (86)	49 (120)	Safe Shutdown	50 (122)
Div 1, 2, 3 and 4 electrical penetrations Electrical cables and penetrations. Room Nos 1711, 1721, 1731, 1741 Representative Room: 1741	41 (106)	54 (129)	Safe Shutdown	110 (230)
Mechanical penetrations Outboard isolation valves Room Nos 1712, 1722, 1732, 1742 Representative Room: 1712	41 (106)	61 (142)	Safe Shutdown	110 (230)
SLC tank rooms SLC tank instrumentation Room Nos 1713, 1723 Representative Room: 1723	30 (86)	39 (102)	Safe Shutdown	50 (122)
Main Steam Tunnel Main Steamline (MSL) isolation valves MSL drain isolation valves FW isolation valves Room No 1770 Accident Conditions	43 (109)	Section 6.2 Analysis	Section 6.2 Analysis	117 (243)
IC/PCCS pools ICS pools instrumentation Room Nos 18P3A/B/C/D, 18P4A/B/C/D/E/F, 18P5A/B/C, 18P6A/B/C Accident Conditions	43 (109)	Section 6.2 Analysis	Section 6.2 Analysis	112 (234)