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Subject: **Response to Portion of NRC Request for Additional Information Letter Nos. 124 and 126 Related to ESBWR Design Certification Application – Design of Structures, Components, Equipment, and Systems - RAI Numbers 3.11-18 and 14.3-218**

The purpose of this letter is to submit the GE Hitachi Nuclear Energy (GEH) response to a portion of the U.S. Nuclear Regulatory Commission Request for Additional Information (RAI) sent by NRC Letter 124, dated January 14, 2008 (Reference 1) and Letter 126 dated December 20, 2007 (Reference 2). The GEH response to RAI Numbers 3.11-18 and 14.3-218 are addressed in Enclosure 1.

Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in DCD Revision 5.

Should you have any questions about the information provided here, please contact me.

Sincerely,

James C. Kinsey

James C. Kinsey
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 08-029, *Letter from the U.S. Nuclear Regulatory Commission to Robert E. Brown, Request for Additional Information Letter No. 124, Related To ESBWR Design Certification Application*, dated January 14, 2008
2. MFN 07-718, *Letter from the U.S. Nuclear Regulatory Commission to Robert E. Brown, Request for Additional Information Letter No. 126, Related To ESBWR Design Certification Application*, dated December 20, 2007

Enclosure:

1. Response to Portion of NRC Request for Additional Information Letter Nos. 124 and 126 Related to ESBWR Design Certification Application – Design of Structures, Components, Equipment, and Systems - RAI Numbers 3.11-18 and 14.3-218

cc:	AE Cubbage	USNRC (with enclosure)
	RE Brown	GEH/Wilmington (with enclosure)
	DH Hinds	GEH/Wilmington (with enclosure)
	GB Stramback	GEH/San Jose (with enclosure)
	eDRF	0000-0082-3077, Revision 0 (RAI 3.11-18)
		0000-0082-3065, Revision 0 (RAI 14.3-218)

Enclosure 1

MFN 08-397

Response to Portion of NRC Request for

Additional Information Letter Nos. 124 and 126

Related to ESBWR Design Certification Application

Design of Structures, Components, Equipment, and Systems

RAI Numbers 3.11-18 and 14.3-218

Verified DCD changes associated with this RAI response are identified in the enclosed DCD markups by enclosing the text within a black box. The marked-up pages may contain unverified changes in addition to the verified changes resulting from this RAI response. Other changes shown in the markup(s) may not be fully developed and approved for inclusion in DCD Revision 5.

NRC RAI 3.11-18

NRC Summary:

Provide analysis to confirm room temperatures for normal and accident conditions.

NRC Full Text:

Tables 3H-3, 3H-4, 3H-9, and 3H-10 for the reactor building and control building provide maximum room temperatures for normal and accident conditions used in the establishment of equipment qualification. Please provide an analysis that shows that these temperatures will not be exceeded. The analysis should consider all heat loads affecting the room such as equipment loads, HVAC operation if it is not isolated, heat loads from adjoining rooms, solar loads, personnel loads, lighting, and external environmental conditions for both winter and summer design conditions to the extent they impact room temperatures. If passive measures are used to remove heat loads, please clearly identify these passive measures, the conditions under which they operate, and any surveillance activities that would be required. This analysis should be referenced and summarized in the DCD to support a finding of acceptability.

GEH Response

Detailed thermo-hydraulic heat up analyses were performed with the computer code CONTAIN 2.0 to calculate the room heat up in the Reactor Building and Control Building to show that the equipment qualification temperatures presented in Tables 3H-3, 3H-4, 3H-9, and 3H-10 will not be exceeded. The Reactor Building and Control Building are integrated models so that room-to-room interactions would be considered.

All heat loads were considered in the modeling of the buildings. The electrical heat loads considered in the calculations can be found in Table 3H-12. A 10% margin was considered for all electrical heat loads except in the Control Room Habitability Area (CRHA) heat loads where a 15% margin was considered. During accident conditions, Heating Ventilation and Air Conditioning (HVAC) is considered to be unavailable and therefore will not provide a heat load. Solar loads, personnel loads and lighting have been considered in the calculations. All calculations are performed for summertime conditions with the exception of the CRHA where summertime and wintertime conditions are considered. The case for the CRHA post 72 hours presented in Table 3H-15 which accounts for heat loads from people and minimal lighting only, demonstrates that the cool down for the Reactor Building and Control Building are inconsequential because of the 200 l/s of -40°C (-40°F) air that is being blown into the CRHA by the Emergency Filter Units (EFUs). There will be no outside air blown mechanically into rooms containing safety related equipment in the remaining control building rooms or reactor building rooms. Cases were considered to ensure that the 0% exceedance outside air temperature was bounding, and 100% relative humidity with additional moisture created by CRHA occupants (latent load) would not lead to a

72 hour CRHA air temperature higher than the 0% exceedance coincident maximum temperature, and ensure the heat absorbed by the CRHA structures would not be adversely impacted by the condensation created. The results of this analysis show that higher humidity ratios, and subsequently higher specific enthalpy, do not affect the maximum temperature reached with little condensation occurring on the walls of the control room.

An initial room temperature higher than design value maximum temperature is assumed in all rooms except the CRHA where the maximum design temperature is considered. The event considered in the analysis is the most limiting between a Loss Of Coolant Accident (LOCA) (including Main Steam Line Break (MSLB)) or High Energy Line Break (HELB) with each concurrent with Loss Of Offsite Power (LOOP). Normal HVAC heating and/or cooling is lost for the first 72 hours of the event. After 72 hours the safety-related equipment heat loads are no longer accounted for because the safety-related equipment needed to maintain safe shutdown no longer requires power to perform their safety functions. Additional cases were considered with HVAC power restored to mitigate the safety-related equipment heat loads. During the first 2 hours of the event the nonsafety-related heat loads in the Reactor Building and in the Control Building outside of the CRHA powered by the nonsafety-related batteries are considered in the analysis. Safety-related heat loads are considered throughout the duration of the event when power is available. The CRHA calculation only considers safety-related heat loads. Nonsafety-related equipment de-energizes if active cooling is not available. Conservatively, no credit is taken for heat transfer to the ground or basement. The surveillances required are outlined in Chapter 16 Subsection 3.7.2.

When rooms are located on the same level and have similar dimensions and internal heat loads, the most unfavorable room is taken to be the representative room for that group of rooms. Table 3H-15 summarizes the representative room temperatures and locations of the room groups.

During the transient event concurrent with LOOP and loss of normal HVAC the heat generated in the rooms is absorbed by the surrounding walls, floor and ceiling. The building concrete acts as a heat sink for passive heat removal. The building is modeled with reinforced concrete steel with a thermal conductivity lower than the design value. The room temperature rises quickly because the heat absorption capacity of air is very low. The heat transfer to the walls floor and ceiling maintain the environmental temperatures below the qualification temperature.

DCD Impact

DCD Tier 2, Appendix 3H.3.2 will be revised as noted in the attached markup in revision 5.

DCD Tier 2, Table 3H-12 will be revised as noted in the attached markup in revision 5.

DCD Tier 2, Tables 3H-14 and 3H-15 will be added to appendix 3H in revision 5.

DCD Tier 2, Figure 3H-2 will be added to appendix 3H in revision 5.

NRC RAI 14.3-218

NRC Summary:

CRHA in a Winter DBA Condition

NRC Full Text:

DCD Tier 1, Table 2.16.2-4, Item 4 identifies an ITAAC to ensure that the control room habitability area bulk air temperature will be maintained within the given habitable temperature range. However, the ITAAC addresses only the loss of cooling during the summer conditions, as it focuses on the maximum CRHA air temperature rise that would result from the loss of normal cooling. The ITAAC does not cover a loss of heating during cold weather.

(A) DCD Tier 2, Table 9.4-1 does not report the maximum CRHA (station blackout) temperature drop below normal operating temperatures, during a winter situation. Please provide the CRHA temperature drop limit.

(B) Please provide an ITAAC to cover the loss of normal heating during a winter DBA condition, and to ensure that the CRHA bulk air temperatures is acceptable.

GEH Response

The CRHA air temperature rise requirement is based on the EPRI Utilities Requirements Document (URD) Volume 3, Chapter 9, Section 8.2. The URD does not specify a temperature drop limit.

(A) There is not a CRHA temperature drop limit. However analysis will be provided in the DCD Tier 2, Appendix 3H to show the temperature drop in the CRHA during wintertime conditions.

(B) There is not an identified requirement for a temperature drop limit. An ITAAC is not necessary to ensure that the CRHA temperature drop during wintertime conditions is within acceptable limits because there are no set regulatory limits. However, a conservative analysis for CRHA temperature drop during wintertime conditions will be added to the DCD Tier 2, Appendix 3H per RAI 3.11-18 (contained within this letter). The temperatures presented in the analysis are acceptable for habitability and equipment qualification.

DCD Impact

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

- Control Building
- Reactor Building outside containment

The region inside the reactor buildingRB surrounding the containment encloses penetrations through the containment. The Control Room Habitability Area (CRHA) includes the main control room_ and areas adjacent to the control room containing operator facilities. Also located in the control buildingCB are safety-related distributed control and information system (DCIS) rooms, located at elevation -7400 mm. Major equipment zones are shown on the reactor buildingRB arrangement drawing (Figures 1.2-1 to 1.2-9).

3H.3 ENVIRONMENTAL CONDITIONS

Table 3H-1 contains a cross listing of the environmental data tables arranged by location and by type of condition.

3H.3.1 Plant Normal Operating Conditions

Tables 3H-2 through 3H-4 define the thermodynamic conditions (pressure, temperature and humidity) for normal operating conditions for areas containing safety-related equipment. Figures showing equipment location and system configurations are referenced in each table. TablesTable 3H-5 through 3H-7 define specifies the radiation environmental conditions inside the containment vessel for normal operating conditions. Section 9.4 defines the Fuel Building thermodynamic conditions for normal operating conditions.

3H.3.2 Accident Conditions

Thermodynamic conditions for safety-related equipment in the containment vessel, Control BuildingCB and Reactor BuildingRB are presented in Tables 3H-8 through 3H-10 for accident conditions. Post-accident periods for the evaluated heat loadsHeat loads for the evaluated post accident periods are specified in Table 3H-12. In general, the most severe environmental conditions result from a postulated reactor coolant line break inside the containment, loss-of-coolant-accident (LOCA) (bounding case) plus Station Blackout (SBO)loss of offsite power (LOOP), see Chapter 6 for detailed information. However, accident conditions were also considered for ruptures occurring in the steam tunnel and breaks in the RWCU/SDC System outside the containment, high energy line break (HELB) plus SBOLOOP, see Chapter 6 for detailed information. TableTables 3H-6 and 3H-7 list typical 3H-11 specifies the evaluated radiation environmental qualificationsqualification conditions inside for the RB and the CB. Table 3H-11 specifies the radiation environment conditions inside the containment vessel during accidents. The EQ program confirms explicit radiation and thermodynamic conditions during accidents. The limiting thermodynamic conditions in the Fuel Building results from the boiling of the spent fuel pool. The thermodynamic conditions during an accident when the spent fuel pool boils is a limiting temperature of 104°C (219°F), with 100% relative humidity and a pressure of 14 kPag (2 psig).

3H.3.2.1 Transient Room Temperature Analysis

The performance evaluation for environmental qualification show conformance to the requirements identified in Section 3.11.

Acceptance Criteria

The design meets the following Acceptance Criteria:

- **Environmental Qualification Maximum Temperatures** – The maximum temperature limit for which the safety-related equipment is qualified is not exceeded. The maximum temperature limit is specified in Tables 3H-9 and 3H-10.
- **Control Room Habitability Area Temperature** – The maximum bulk temperature meets the acceptance criteria stated in Subsection 9.4.1.

Analysis Assumptions

The analysis event assumptions are summarized below. Initial conditions and assumptions can be found in Table 3H-14. Heat loads used in the analysis are found in Table 3H-12.

- The event presented is the most limiting between LOCA or HELB with each concurrent with LOOP.
- Normal heating, ventilation and air conditioning (HVAC) heating and/or cooling is lost for the first 72 hours of the accident.
- After 72 hours the safety-related equipment heat loads are no longer accounted for because the safety-related equipment needed to maintain safe shutdown no longer requires power to perform their safety-related functions. Normal HVAC mitigates the safety-related equipment heat loads when power is available.
- During the first 2 hours of the event the nonsafety-related heat loads in the RB and in the CB outside of the CRHA powered by the nonsafety-related batteries are considered in the analysis.
- Safety-related heat loads are considered throughout the duration of the event when power is available.
- The CRHA calculation only considers safety-related heat loads. Nonsafety-related equipment deenergizes if active cooling is not available.
- Room to room interactions are considered in all calculations.
- Outside air intake from the EFU is considered for the CRHA calculation during maximum and minimum temperature conditions.
- No credit is taken for heat transfer to the ground.

Analysis Results

As shown in Table 3H-15, the environmental qualification temperatures for safety-related equipment is not exceeded during the limiting event based on the presented detailed thermo-hydraulic analyses performed with CONTAIN 2.0. When rooms are located on the same level and have similar dimensions and internal heat loads, the most unfavorable room is taken to be the representative room for that group of rooms. Solar heat loads were applied to rooms located above grade. Table 3H-15 summarizes the representative room temperatures and locations of the room groups.

During the transient event concurrent with LOOP and loss of normal HVAC the heat generated in the rooms is absorbed by the surrounding walls, floor and ceiling. The building concrete acts as a heat sink for passive heat removal. The room temperature rises quickly because the heat absorption capacity of air is very low. The heat transfer to the walls floor and ceiling maintain the environmental temperatures below the qualification temperature.

During wintertime conditions the RB and CB are isolated and equipment room cool down is insignificant. The case for the CRHA post 72 hours presented in Table 3H-15 which accounts for heat loads from people and minimal lighting only, demonstrates that the cool down for the RB and CB are inconsequential. The injection of ambient air at wintertime conditions when safety-related heat loads are not present provides a faster cool down rate than the other rooms located in the RB and CB. For the winter conditions the 0% exceedance minimum dry bulb ambient outside air temperature (-40C°/°F) was considered. For the summer conditions the 0% exceedance coincident maximum dry bulb and wet bulb ambient outside air temperature [47.2°C (117°F) DBt and 26.7°C (80°F) WBt] was considered. The daily temperature range applied was Δ 15°C (27°F).

The temperature in the CRHA remains below the temperature rise acceptance criteria outlined in Subsection 9.4.1. The 0% exceedance coincident maximum temperature case is presented in Figure 3H-2. Cases were considered to ensure that the 0% exceedance maximum outside air temperature was bounding and 100% relative humidity with additional moisture created by CRHA occupants (latent load) would not lead to a 72 hour CRHA air temperature higher than the 0% exceedance coincident maximum temperature case, and ensure the heat absorbed by the CRHA structures would not be adversely impacted by the condensation created. The results of this analysis show that higher humidity ratios, and subsequently higher specific enthalpy, do not affect the maximum temperature reached with little condensation occurring on the walls of the control room. The concrete heat sink provides enough thermal mass to keep the CRHA within limits during the limiting event by absorbing heat loads or heating ambient air during summer or winter conditions.

3H.3.3 Water Quality

Reactor water design quality characteristics during normal operation are:

- PH range: 5.6 to 8.6
- Silica (as SiO_2) ≤ 200 ppb (100 ppb operating target)
- Conductivity at 25°C ≤ 0.1 µS/cm (0.08 µS/cm operating target)
- Dissolved Oxygen (as O_2) ≤ 300 ppb
- Corrosion product metals ≤ 6 ppb

The standby liquid control (SLC) System injects borated water into the ~~Reactor Pressure Vessel~~RPV during ~~Design Basis Accident (~~DBA~~)~~ LOCA. There is no caustic containment spray in the ESBWR project.

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 ~~SBO~~

Table 3H-12

Room Heat Loads

Rooms	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 SBO scenario. Rooms bounded by HELB conditions, see Chapter 6
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 Chapter 6
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	~~18200~~10140 (34599)	~~18200~~8140 (27774)	~~18200~~8140 (27774)	
1304, 1305, 1306, 1307, 1308	No	HELB	HELB	HELB	Rooms bounded by HELB conditions, see Chapter 6
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	No	300 (1024)	0	0	
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)	
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 Chapter 6

Table 3H-12

Room Heat Loads

Rooms	Contain safety-related equipment	Heat Load (W) (BTU/h)[1]			Remarks
		0 – 2 hr	2 – 24 hr	24 – 72 hr	
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 Chapter 6
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 (~~3275, 3201, 3202, 3204, 3205, 3270, 3271, 3272, 3273, 3274~~Figure 3H-1)	Yes	~~7375~~7630 (26035) (Note this does not include the nonsafety-related heat loads. There is a cooling system sized to remove the nonsafety-related heat loads for 2 hr. See Subsection 9.4.1)	~~7375~~7630 (26035)	~~7375~~7630 (26035)	200 l/s (425 cfm) of outside air are considered (see Table 9.4-1). It is assumed that the control room habitability area is well mixed. Heat load provided for overall CRHA.
(Deleted)~~3276~~	~~No~~	~~2000~~	~~0~~	~~0~~	
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	54000 (184256)	0	0	Louver for each room maintains a maximum temperature of 50°C (122°F) during ~~SBO~~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.

Table 3H-14

Input Parameters, Initial Conditions and Assumptions used in Reactor Building and Control Building Heat up Analyses

Parameter	Analytical Value	Design Value
Initial Ground Temperature °C (°F)[1]	30 (86)	15.5 (60)
HELB Temperatures	See Chapter 6 Analysis	See Chapter 6
LOCA Temperatures	See Chapter 6 Analysis	See Chapter 6
Heat Sink Initial Temperature[2]	Table 3H-15	Table 3H-15
CRHA Day and Night Temperature Profile Δ °C (°F)[3]	15 (27)	15 (27)
EFU Outside Air Supply into CRHA l/s (cfm)	200 (424)	200 (424)
Concrete Thermal Conductivity for RB and CB W/m°C (Btu·in/h·ft²·°F)[4]	0.865 (6.00)	1.63 (11.3)
Concrete Specific Heat J/kg·°C (Btu/lb°F)[4]	653.1 (0.156)	879.2 (0.210)
Concrete Density kg/m³ (lb/ft³)[4]	1922.2 (120.00)	2394.8 (149.50)
CRHA Heat Sink Perimeter m (ft)	103 (338)	103 (338)
CRHA Heat Sink Perimeter Wall Thickness in Contact with the Ground m (ft)	0.90 (2.95)	0.90 (2.95)
CRHA Heat Sink Perimeter Wall Thickness in Contact with the Corridor m (ft)	0.50 (1.64)	0.50 (1.64)
CRHA Heat Sink Thickness of Internal Walls and Walls not in contact with the Ground or Corridor m (ft)	0.30 (0.98)	0.30 (0.98)
CRHA Heat Sink Height m (ft)	6.15 (20.2)	6.15 (20.2)
CRHA Heat Sink Ceiling/Floor Area m² (ft²)	443 (4769)	443 (4769)
CRHA Heat Sink Ceiling/Floor Thickness m (ft)	0.50 (1.64)	0.50 (1.64)
CRHA Room Volume m³ (ft³)	2724 (96197)	2724 (96197)

(1) Heat transfer to the ground is not considered once the accident begins. During wintertime conditions the CB calculation uses 15.5°C (60°F) as the initial ground temperature. This temperature is used to set the initial temperature of the concrete heat sink.

(2) The initial temperature considered on surface structures is made equal on both faces and equal to the room temperature when the room temperature is the same on both sides of the wall, floor or ceiling. When rooms have no equal room temperatures on both sides in normal operation, a linear temperature distribution across the wall is used.

(3) During summertime conditions the maximum CB design temperature is used 47.2°C (117°F), during wintertime conditions the minimum CB design temperature is used – 40°C/°F.

(4) Combinations of thermal concrete properties were used for the RB calculation. The most limiting value is presented in the results.

Table 3H-15

Analytical Room Environmental Temperatures

Rooms	Temperature °C (°F)			
	Normal Operation (Analytical)[1]	72 hrs	168 hrs	Max Qualification Temperature
Hydraulic Control Unit (HCU) Rooms HCU, RPS solenoids and RPV water level instrument racks Room No 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 No 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 No 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 No 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 No 1300, 1301, 1302, 1303 Representative Room: 1302	41 (106)	67 (153)	Safe Shutdown	110 (230)
Div 1, 2, 2 and 4 electrical penetration rooms Electrical cables and penetrations Room No 1312, 1322, 1332, 1342 Representative Room: 1312	41 (106)	59 (138)	Safe Shutdown	110 (230)
Remote shutdown panel Rooms No 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 No 1500, 1501, 1502, 1503 Representative Room: 1501	30 (86)	46 (115)	Safe Shutdown	50 (122)

Table 3H-15

Analytical Room Environmental Temperatures

Rooms	Temperature °C (°F)			
	Normal Operation (Analytical)(1)	72 hrs	168 hrs	Max Qualification Temperature
Div 1, 2, 3 and 4 electrical penetrations (EL.13570) Electrical cables and penetrations Rooms No 1610, 1620, 1630, 1640 Representative Room: 1610	41 (106)	59 (138)	Safe Shutdown	110 (230)
Div 1and 4 corridors rooms (access to penetration area), divisional electrical cables and safety-related DCIS RMUs Rooms No 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 Rooms No 1720, 1730 Representative Room: 1720	30 (86)	49 (120)	Safe Shutdown	50 (122)
Div 1, 2, 3 and 4 electrical penetrations (EL. 17500) Electrical cables and penetrations. Rooms No 1711, 1721, 1731, 1741 Representative Room: 1741	41 (106)	54 (129)	Safe Shutdown	110 (230)
Mechanical penetrations (EL. 17500) Outboard isolation valves Rooms No 1712, 1722, 1732, 1742 Representative Room: 1712	41 (106)	61 (142)	Safe Shutdown	110 (230)
SLC tank rooms SLC tank instrumentation Rooms No 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 Rooms No 1770 Accident Conditions	43 (109)	Chapter 6 Analysis	Chapter 6 Analysis	117 (243)

Table 3H-15

Analytical Room Environmental Temperatures

Rooms	Temperature °C (°F)			
	Normal Operation (Analytical)[1]	72 hrs	168 hrs	Max Qualification Temperature
IC/PCCS pools ICS pools instrumentation Rooms No 18P3A/B/C/D, 18P4A/B/C/D/E/F, 18P5A/B/C, 18P6A/B/C Accident Conditions	43 (109)	Chapter 6 Analysis	Chapter 6 Analysis	112 (234)
Control Room Habitability Area Main control room panels Figure 3H-1 Summertime Conditions	25.56 (78)	33.3 (92)	34.4 (94)	8.33 (15.0) Max Increase for 72 hrs
Control Room Habitability Area Main control room panels Figure 3H-1 Wintertime Conditions	22.78 (73)[2]	16 (61)[3]	13 (55)	Unspecified
Div 1, 2, 3 and 4 electrical rooms Safety-related DCIS panels Rooms No 3110, 3120, 3130 and 3140	27 (81)[2]	39 (102)	Safe Shutdown	45 (113)
Safety-related portions of CRHA Ventilation Subsystem Rooms No 3406, 3407	40 (104)[2]	44 (112)	Safe Shutdown	50 (122)
Electrical Chases Room No 3250, 3261	27 (81)[2]	38 (114)	Safe Shutdown	110 (230)

(1) All rooms in the RB and CB are evaluated at higher than expected normal operating temperatures unless otherwise noted. The HVAC equipment rooms start at a temperature of 40°C (104°F) as stated in Subsection 9.4.1.

(2) During winter conditions the CB room initial temperatures, with the exception of the CRHA, are set to 18.3°C (65°F).

(3) The CRHA heat loads considered during this period is 2821 Watts.

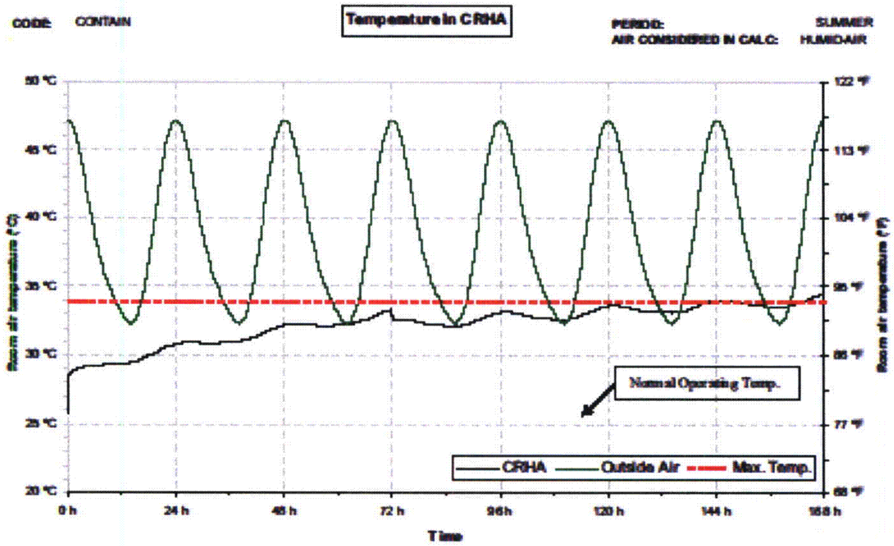

Figure 3H-2. Control Room Habitability Area Heat up – 0% Exceedance Maximum Temperature Case