ArevaEPRDCPEm Resource

From: WELLS Russell D (AREVA NP INC) [Russell.Wells@areva.com]
Sent: Monday, December 08, 2008 6:17 PM
To: Getachew Tesfaye
Cc: John Rycyna; Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 93, Supplement 1, FSAR Ch 2
Attachments: RAI 93 Supplement 1 Response US EPR DC.pdf

Getachew,

On November 4, 2008, AREVA NP Inc. (AREVA NP) provided a schedule for complete responses to the question of RAI 93. The attached file, "RAI 93 Supplement 1 Response US EPR DC.pdf" provides technically correct and complete responses to the question, as committed.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 93 Question 02.03.01-12.

The following table indicates the respective pages in the response document, "RAI 93 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 93 — 02.03.01-12	2	6

This concludes the formal AREVA NP response to RAI 93, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

(Russ Wells on behalf of)
Ronda Pederson
ronda.pederson@areva.com
Licensing Manager, U.S. EPR Design Certification
New Plants Deployment
AREVA NP, Inc.
An AREVA and Siemens company
3315 Old Forest Road
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From: WELLS Russell D (AREVA NP INC)
Sent: Tuesday, November 04, 2008 3:07 PM
To: 'Getachew Tesfaye'
Cc: 'John Rycyna'; Pederson Ronda M (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 93, FSAR Ch 2

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 93 Response US EPR DC.pdf" states that a complete answer cannot be currently provided for the question in this RAI.

The following table provides the page(s) in the response document, "RAI 93 Response US EPR DC.pdf" containing the response to each question.

Question #	Start Page	End Page
RAI 93 — 02.03.01-12	2	2

A complete answer is not provided for 1 of the 1 questions. The schedule for a technically correct and complete response to this question is provided below.

Question #	Response Date
RAI 93 — 02.03.01-12	December 19, 2008

Sincerely,

(Russ Wells on behalf of)

Ronda Pederson
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From: Getachew Tesfaye [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Thursday, October 09, 2008 3:59 PM
To: ZZ-DL-A-USEPR-DL
Cc: Joseph Hoch; Charles Cox; John Rycyna; Joseph Colaccino
Subject: U.S. EPR Design Certification Application RAI No. 93 (1085), FSARCh. 2

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on September 26, 2008, and on October 6, 2008, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 15

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Subject: Response to U.S. EPR Design Certification Application RAI No. 93, Supplement 1, FSAR Ch 2
Sent Date: 12/8/2008 6:16:42 PM
Received Date: 12/8/2008 6:17:05 PM
From: WELLS Russell D (AREVA NP INC)

Created By: Russell.Wells@areva.com

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Tracking Status: None

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MESSAGE	3801	12/8/2008 6:17:05 PM
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Reply Requested: No
Sensitivity: Normal
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Response to

Request for Additional Information No. 93 Supplement 1 (1085), Revision 0

10/9/2008

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 02.03.01 - Regional Climatology
Application Section: 2.3.1

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

Question 02.03.01-12:

Specify and identify the normal and extreme liquid and frozen precipitation events used in the design of the roofs of safety related structures in accordance with the Proposed Interim Staff Guidance (ISG) DC/COL-ISG-07, "Interim Staff Guidance on Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures." These events should be identified as site parameters in DCD Tier 1 Table 5.0-1 and Tier 2 Table 2.1-1. Provide a basis for the chosen site parameter values, including ensuring the postulated site parameter values are representative of a reasonable number of sites that have been or may be considered for a COL application. Also describe the design and analysis method used to accommodate the resulting loads.

Response to Question 02.03.01-12:

The roof design of U.S. EPR standard plant structures accommodates both the normal and the extreme winter precipitation events in accordance with the recommendations of Standard Review Plan Section 2.3.1 and Proposed Interim Staff Guidance DC/COL-ISG-07.

Normal Winter Precipitation:

As stated in U.S. EPR FSAR Tier 2, Section 2.3.1.1, the normal precipitation load is based on the weight of the 100-year snow pack or snow fall, whichever is greater. For the U.S. EPR standard plant, these values are:

Normal Ground Precipitation Load:	100 psf	(100-year MRI)
Normal Roof Precipitation Load:	70 psf	(100-year MRI)

Where: MRI = Mean Recurrence Interval

The normal precipitation load is selected to cover a wide range of potential power plant sites in the U.S. The selected 100 psf value converts to 82 psf for a 50-year MRI. A review of ASCE/SEI 7-05, “Minimum Design Loads for Buildings and Other Structures”, Figure 7-1, reveals that snow pack in excess of 82 psf occurs in limited areas of the U.S.

Extreme Winter Precipitation:

As stated in U.S. EPR FSAR Tier 2, Section 2.3.1.1, extreme winter precipitation is based on the sum of the weights of the 100-year snow pack and the 48 hour probable maximum winter precipitation (PMWP). For the U.S. EPR standard plant, these values are:

48-Hour PMWP Liquid Event:	32 inches	
48-Hour PMWP Liquid Roof Load:	0 psf	(no parapets)
48-Hour PMWP Frozen Event:	55 inches	
48-Hour PMWP Frozen Ground Load:	43 psf	

48-Hour PMWP Frozen Roof Load:	30 psf	
Extreme Ground Precipitation Load:	143 psf	(100-year MRI)
Extreme Roof Precipitation Load:	100 psf	(100-year MRI)

The maximum 48-hour liquid PMWP event of 32 inches is the average of the maximum 24-hour and 72-hour winter precipitation data obtained from NOAA Hydrometeorological Report No. 53 "Seasonal Variation of 10-square-mile Probable Maximum Precipitation Estimates, United States East of the 105th Meridian" for the three winter months – December through February. U.S. EPR standard plant structures have no parapets, thus liquid precipitation events have no significant effect on roof loading.

The maximum 48-hour frozen PMWP event of 55 inches is based on a review of NOAA data for maximum 2-day snowfall for all available stations in the lower 48 states and Alaska on data through December 2006. Only limited areas of the U.S. exceed the bounding 55 inch snowfall value.

U.S. EPR FSAR Tier 2, Section 3.8.4.3.1 provides details of the analysis method used to convert ground snow loads to roof snow loads. Ground level values are adjusted to represent appropriate roof level values using Chapter 7 of ASCE/SEI 7-05. U.S. EPR FSAR Tier 2, Section 3.8.4.3.1 describes the factors used to compute roof snow loads. The 50-year return snow pack value from Figure 7.1 of ASCE/SEI 7-05 is converted to 100-year return snow pack using the provisions from Table C7-3 of ASCE/SEI 7-05.

COL applicants will verify that site-specific normal and extreme roof live loads are bounded by FSAR values, based on site-specific climatology and local meteorology as indicated in U.S. EPR FSAR Tier 2, Section 2.0 and COL item #2.3-1.

U.S. EPR standard plant structure roof design conservatively uses a roof live load of 100 psf for both normal and extreme precipitation loads. The design and analysis methods used to accommodate resulting roof design loads are described in U.S. EPR FSAR Tier 2, Section 3.8.

The precipitation parameters listed in U.S. EPR FSAR Tier 1, Table 5.0-1 and Tier 2, Table 2.1-1 currently represent the extreme and normal roof snow load as the weight of the 100-year snow pack plus the weight of a frozen 48-hour PMWP event.

The U.S. EPR FSAR will be revised to clarify normal and extreme winter precipitation events and resulting normal and extreme roof loads.

U.S. EPR FSAR Tier 1, Table 5.0-1, Precipitation Parameters will be revised to state:

Precipitation	
Parameter	**Value (s)**
Rainfall rate	19.4 in/hr
Normal ground precipitation load	100 psf (100-year MRI)
Normal roof precipitation load	70 psf (100-year MRI)
48-hour PMWP liquid roof load	0 psf (1)
48-hour PMWP frozen ground load	43 psf (based on 55 inches)
48-hour PMWP frozen roof load	30 psf
Extreme roof winter precipitation load	100 psf (100-year MRI)

(1) The maximum 48-hour PMWP liquid of 32 inches is based on data obtained from NOAA Hydrometeorological Report No. 53 "Seasonal Variation of 10-square-mile Probable Maximum Precipitation Estimates, United States East of the 105th Meridian" for the three winter months – December through February. However, the effect of rainfall events on roof loads is negligible, due to the lack of parapets.

U.S. EPR FSAR Tier 2, Table 2.1-1, Precipitation section will be revised to state:

Precipitation (Refer to Section 2.4)	
Parameter	**Value (s)**
Rainfall rate	≤19.4 in/hr
Normal ground precipitation load	≤100 psf (100-year MRI)
Normal roof precipitation load	≤ 70 psf (100-year MRI)
48-hour PMWP liquid roof load	0 psf (1)
48-hour PMWP frozen ground load	≤ 43 psf (based on 55 inches)
48-hour PMWP frozen roof load	≤ 30 psf
Extreme winter precipitation roof load	≤100 psf (100-year MRI)

(1) The maximum 48-hour PMWP liquid of 32 inches is based on data obtained from NOAA Hydrometeorological Report No. 53 "Seasonal Variation of 10-square-mile Probable Maximum Precipitation Estimates, United States East of the 105th Meridian" for the three winter months – December through February. However, the effect of rainfall events on roof loads is negligible, due to the lack of parapets.

U.S. EPR FSAR Tier 2, Section 2.3.1 – first bulleted item will be revised to read:

"Weight of the normal winter precipitation event and the weight of the extreme winter precipitation event."

U.S. EPR FSAR Tier 2, Section 2.3.1.1 – third paragraph will be revised to read:

"The prescribed loads included in the combination of normal live loads are based on the weight of the normal winter precipitation event recorded at ground level. Winter precipitation loads to be included in the combination of extreme live loads is based on the addition of the weight of the extreme frozen or liquid precipitation event, whichever is greater. Snow pack and snowfall are adjusted for density differences and ground level values are adjusted to represent appropriate weights on roofs."

U.S. EPR FSAR Tier 2, Section 2.4 – second paragraph, second sentence will be revised to read:

"A rain, snow, and ice load of 100 pounds per square foot has been used, which includes the weight of the normal winter precipitation event and the weight of the extreme winter precipitation event."

U.S. EPR FSAR Tier 2, Section 3.8.4.3.1 – second bullet, fourth paragraph, second sentence, will be revised to read:

> "This value is postulated as a meteorological site parameter for the extreme winter precipitation load and includes the weight of the normal winter precipitation event and the weight of the extreme winter precipitation event."

FSAR Impact:

U.S. EPR FSAR Tier 1, Table 5.0-1 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Table 2.1-1 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR FSAR Tier 2, Sections 2.3.1, 2.3.1.1, 2.4 and 3.8.4.3.1 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

02.03.01-12

Table 5.0-1—Site Parameters for the U.S. EPR Design (5 Sheets)

Precipitation	
Parameter	**Value(s)**
Rainfall rate ~~(for roof design)~~	~~Maximum site rainfall rate of 19.4 inches per hour.~~19.4 in/hr
Normal ground precipitation load	100 psf (100-year MRI)
Normal roof precipitation load	70 psf (100-year MRI)
48-hour PMWP liquid roof load	0 psf (1)
48-hour PMWP frozen ground load	43 psf (based on 55 inches)
48-hour PMWP frozen roof load	30 psf
Extreme roof winter precipitation load ~~Snow & Ice Load (for roof design)~~	100 psf (100-year MRI)~~Maximum snow and ice load of 100 psf extreme live load.~~
Seismology	
Parameter	**Value(s)**
Seismology (SSE response spectra ~~using figures~~)	Horizontal design ground motion shall be the certified seismic design response spectra shapes anchored to a peak ground acceleration of 0.3 g (see Figure 5.0-1). Vertical spectra shall be the same as the horizontal spectra (see Figure 5.0-1).
Flood Level	
Parameter	**Value(s)**
Maximum flood or tsunami	Maximum flood or tsunami level is no more than 1 ft below grade.
Temperature	
Parameter	**Value(s)**

Table 5.0-1—Site Parameters for the U.S. EPR Design (5 Sheets)

Atmospheric Dispersion Factors (χ/Q)	
Parameter	**Value(s)**
Meteorological Dispersion (values at EAB, and LPZ at appropriate time intervals for short and long term)	Atmospheric dispersion factors – χ/Q (sec/m^3) - Exclusion Area Boundary (0.5 mi) χ/Q 0 - 2 hours ≤ 1.00E-03 - Low Population Zone (1.5 mi) χ/Q 0 – 2 hours ≤ 1.75E-04 2 – 8 hours ≤ 1.35E-04 8 – 24 hours ≤ 1.00E-04 1 – 4 days ≤ 5.40E-05 4 – 30 days ≤ 2.20E-05

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1) The maximum 48-hour PMWP liquid of 32 inches is based on data obtained from NOAA Hydrometeorological Report No. 53 "Seasonal Variation of 10-square-mile Probable Maximum Precipitation Estimates, United States East of the 105th Meridian" for the three winter months – December through February. However, the effect of rainfall events on roof loads is negligible, due to the lack of parapets.

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Table 2.1-1—U.S. EPR Site Design Envelope
Sheet 1 of 8

U.S. EPR Site Design Envelope	
Precipitation (Refer to Section 2.4)	
Rainfall rate	≤19.4 in/hr
~~Snow (design: extreme live load, including 48-hour probable maximum winter precipitation)~~Normal ground precipitation load	≤100 psf (100-year MRI)
Normal roof precipiation load	≤70 psf (100-year MRI)
48-hour PMWP liquid roof load	0 psf(1)
48-hour PMWP frozen ground load	≤43 psf (based on 55 inches)
48-hour PMWP frozen roof load	≤30 psf
Extreme winter precipitation roof load	≤100 psf (100-year MRI)
Seismology (Refer to Sections 2.5 & 3.7)	
Horizontal SSE Acceleration	0.3g Peak (CSDRS shapes – See Section 3.7.)
Vertical SSE Acceleration	0.3g Peak (CSDRS shapes – See Section 3.7.)
Fault Displacement Potential	No fault displacement is considered for safety-related SSCs in U.S. EPR design certification.
Soil (Refer to Section 2.5)	

Table 2.1-1—U.S. EPR Site Design Envelope
Sheet 8 of 8

U.S. EPR Site Design Envelope									
Main Control Room/Technical Support Center Unfiltered Inleakage Atmospheric Dispersion Factors for Onsite Accident Dose Analysis (χ/Q)									
Time Period	Vent Stack Base	Releases via Safe-guard Building Canopy #1	Releases via Safe-guard Building Canopy #2	Equip-ment Hatch Releases via Material Lock	Depress-urization Shaft Releases	Main Steam Relief Train Silencer #1	Main Steam Relief Train Silencer #2	Main Steam Relief Train Silencer #3	Main Steam Relief Train Silencer #4
0–2 hours (s/m^3)	4.30E-03	1.67E-02	3.03E-03	1.65E-03	7.52E-03	1.93E-03	2.43E-03	1.76E-02	8.65E-03
2–8 hours (s/m^3)	3.71E-03	1.47E-02	2.68E-03	1.47E-03	6.67E-03	1.66E-03	2.12E-03	1.48E-02	7.21E-03
8–24 hours (s/m^3)	1.46E-03	5.96E-03	1.15E-03	5.74E-04	2.88E-03	6.69E-04	8.28E-04	5.88E-03	2.96E-03
1–4 days (s/m^3)	1.12E-03	4.28E-03	7.59E-04	4.37E-04	1.89E-03	5.02E-04	6.38E-04	4.55E-03	2.22E-03
4–30 days (s/m^3)	1.03E-03	3.89E-03	6.89E-04	4.00E-04	1.71E-03	4.65E-04	5.85E-04	4.16E-03	2.06E-03

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~~Notes:~~

(1) The maximum 48-hour PMWP liquid of 32 inches is based on data obtained from NOAA Hydrometeorological Report No. 53 "Seasonal Variation of 10-square-mile Probable Maximum Precipitation Estimates, United States East of the 105th Meridian" for the three winter months – December through February. However, the effect of rainfall events on roof loads is negligible, due to the lack of parapets.

2.3 Meteorology

The U.S. EPR design is based on meteorological parameters (e.g., air temperature extremes, humidity, precipitation such as rainfall, snow and ice, maximum wind speeds, tornado wind speeds, and atmospheric stability characteristics) provided in Section 2.1, Table 2.1-1~~, Envelope of U.S. EPR Site Design Parameters~~. If a COL applicant that references the U.S. EPR design certification identifies site-specific meteorology values outside the range of the design parameters in Table 2.1-1, then the COL applicant will demonstrate the acceptability of the site-specific values in the appropriate sections of the Combined License application.

2.3.1 Regional Climatology

02.03.01-12

The following information is provided in Section 2.1, Table 2.1-1:

- Weight of the normal winter precipitation event and the weight of the extreme winter precipitation event.~~Weight of 100-year return period snow pack and the weight of the 48-hour probable maximum winter precipitation (PMWP).~~
- 100-year, 3-second gust wind speed.
- Tornado parameters.
- Dry bulb and wet bulb temperatures.

2.3.1.1 Basis for Meteorological Parameters

The design parameters for the dry-bulb and wet-bulb temperatures are based on the EPRI ALWR Utility Requirements Document (Reference 1) and available Early Site Permit applications. The two percent annual exceedance dry and wet bulb temperature values, as recommended by RG 1.206 and SRP 2.3.1, are not provided in Table 2.1-1. However, the two percent annual exceedance dry and wet bulb temperature values are bounded by the provided zero percent annual exceedance and one percent annual exceedance dry and wet bulb temperature values.

SRP 2.3.1 and RG 1.206 also recommend that the 100-year maximum dry bulb and coincident wet bulb temperature values, the 100-year maximum non-coincident wet bulb temperature value, and the 100-year minimum dry bulb temperature values be provided. Instead, the zero percent exceedance values for these parameters have been provided. Zero percent exceedance values are based on conservative estimates of historical high and low values for potential sites.

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The prescribed loads included in the combination of normal live loads are based on the weight of the normal winter precipitation event recorded at ground level. Winter precipitation loads to be included in the combination of extreme live loads is based on the addition of the weight of the extreme frozen or liquid precipitation event.

02.03.01-12

whichever is greater. Snow pack and snowfall are adjusted for density differences and ground level values are adjusted to represent appropriate weights on roofs.~~The prescribed loads included in the combination of normal live loads are based on the weight of the 100-year snow pack or snowfall, whichever is greater, recorded at ground level. Winter precipitation loads to be included in the combination of extreme live loads is based on the addition of the weight of the 100-year snow pack at ground level plus the weight of the 48-hour PMWP at ground level for the month corresponding to the selected snow pack. Snow pack and snowfall are adjusted for density differences and ground level values are adjusted to represent appropriate weights on roofs.~~

A COL applicant that references the U.S. EPR design certification will provide site-specific characteristics for regional climatology.

2.3.1.2 Meterological Data for Evaluating the Ultimate Heat Sink

As described in Section 9.2.5, the ultimate heat sink (UHS) is designed to operate for a nominal 30 days following a LOCA without requiring any makeup water to the source, or it must be demonstrated that replenishment or use of an alternate or additional water supply can provide continuous capability of the heat sink to perform its safety-related functions. The tower basin contains a minimum 72-hour supply of water.

Meteorological conditions resulting in the maximum evaporative and drift loss of water for the UHS over a 72 hour period are presented in Table 2.1-3. The UHS cooling tower basin is designed considering the air temperature data of Table 2.1-1 and maintains its cooling function for the Table 2.1-3 meteorological conditions.

Water makeup to the UHS cooling tower basin beyond 72 hours is site-specific. A COL applicant that references the U.S. EPR design certification will describe the means for providing UHS makeup sufficient to meet the maximum evaporative and drift water loss after 72 hours through the remainder of the 30 day period consistent with RG 1.27.

Meteorological conditions resulting in minimum water cooling are presented in Table 2.1-4. These conditions reflect a 1 day period where evaporative cooling is at a minimum. The UHS heat loads peak and decline within the first day, such that extending the 1 day meteorological profile for 5 consecutive days does not cause the UHS cooling tower basin water temperature to exceed the maximum temperature of 95°F listed in Table 2.1-1. The potential for water freezing in the UHS water storage facility is addressed in Section 2.4.

2.3.2 Local Meteorology

A COL applicant that references the U.S. EPR design certification will provide site-specific characteristics for local meteorology.

2.4 Hydrologic Engineering

The U.S. EPR is designed for a groundwater elevation up to 3.3 feet below the finished grade elevation and an exterior flood level of one foot below the finished grade elevation. For factored load combinations, the lateral soil load is based on saturated soil associated with flooding and groundwater. The finished yard grade is nominally one foot below ground floor top of concrete, with slopes provided for drainage to preclude water from entering the buildings. No safety-related dewatering systems are provided in the U.S. EPR. Flood protection features are described in Section 3.4.

02.03.01-12

The U.S. EPR is designed for a maximum rainfall rate of 19.4 inches per hour. A rain, snow, and ice load of 100 pounds per square foot has been used, which includes the weight of the normal winter precipitation event and the weight of the extreme winter precipitation event.~~A rain, snow, and ice load of 100 pounds per square foot has been used, which includes the weight of the 100-year return period snow pack and the weight of the 48-hour probable maximum winter precipitation.~~

The hydrologic information in Section 2.4 is site specific and will be provided by the Combined License (COL) applicant that references the U.S. EPR design certification.

Sites are acceptable that are within the envelope of the groundwater and flood water maximum elevations described for the U.S. EPR standard plant design.

2.4.1 Hydrologic Description

A COL applicant that references the U.S. EPR design certification will provide a site-specific description of the hydrologic characteristics of the plant site.

2.4.2 Floods

A COL applicant that references the U.S. EPR design certification will identify site-specific information related to flood history, flood design considerations, and effects of local intense precipitation.

2.4.3 Probable Maximum Flood (PMF) on Streams and Rivers

A COL applicant that references the U.S. EPR design certification will provide site-specific information to describe the probable maximum flood of streams and rivers and the effect of flooding on the design.

2.4.4 Potential Dam Failures~~, Seismically Induced~~

A COL applicant that references the U.S. EPR design certification will verify that the site-specific potential hazards to safety-related facilities due to the ~~seismically induced~~ failure of upstream and downstream water control structures are within the hydro-geologic design basis.

conditions. Impact forces due to moving loads are applied for the loading condition.

In general, a live load of 400 pounds/ft^2 is applied to FB concrete floors, and 100 pounds/ft^2 live load is applied to concrete floors and to steel grating floors and platforms in other Seismic Category I structures. Floor live loads may vary according to the function of individual floors. Truck loads, fuel cask shipment loads, and loads due to replacement of RCS components are considered as live loads in the loading and material handling bays of the FB. Live loads are applied to cranes and their supports for the lifting capacity and test loads applied for lifting devices. Additional point loads are applied to concrete floors and to concrete and steel beams in local design.

The design live load for rainfall is based on a rate of 19.4 inches per hour, as described in Section 2.4.

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The design live load due to rain, snow, and ice is based on 100 pounds/ft^2 on the ground, as described in Section 2.4. This value is postulated as a meteorological site parameter for the extreme winter precipitation load and includes the weight of the normal winter precipitation event and the weight of the extreme winter precipitation event.~~This value is postulated as a meteorological site parameter for the extreme winter precipitation load and includes the weight of the 100 year return period snowpack and the weight of the 48 hour probable maximum winter precipitation.~~ Roof snow and ice loads are determined using Chapter 7 of ASCE/SEI 7-05, "Minimum Design Loads for Buildings and Other Structures." The following factors are used to compute snow loads on the roofs of Seismic Category I structures:

– C_e, exposure factor = 1.0.

– C_t, thermal factor = 1.0.

– I, importance factor = 1.00 for Seismic Category I structures.

For buried items, the live load includes the effects of surface traffic such as truck loads, rail loads, construction equipment, and construction or maintenance activities.

- Hydrostatic loads (F)—Hydrostatic loads are due to fluids stored in pools and tanks in other Seismic Category I structures (e.g., the spent fuel pool and emergency feedwater storage tanks). Pools and tanks may have either constant or fluctuating liquid levels. Hydrodynamic loads resulting from seismic excitation of fluids are included as a component of the safe shutdown earthquake (SSE) load.

- Thermal loads (T_o)—Thermal loads consist of thermally induced forces and moments resulting from normal plant operation and environmental conditions. Thermal loads and their effects are based on the critical transient or steady-state condition. Thermal expansion loads due to axial restraint, as well as loads resulting from thermal gradients, are considered.