ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Thursday, December 16, 2010 3:33 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); WILLIFORD Dennis (AREVA); Miernicki, Michael
Subject: Response to U.S. EPR Design Certification Application RAI No. 453, FSAR Ch. 2, NEW PHASE 4 RAI, Supplement 1
Attachments: RAI 453 Supplement 1 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided a schedule for a technically correct and complete response to RAI No. 453 on December 6, 2010. The attached file, "RAI 453 Supplement 1 Response US EPR DC.pdf" provides technically correct and complete responses to 4 of the 8 questions.

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 453 Questions 02.03.01-17, 02.03.01-18, and 02.03.04-13.

The following table indicates the respective pages in the response document, "RAI 453 Supplement 1 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 453 — 02.03.01-17	2	3
RAI 453 — 02.03.01-18	4	4
RAI 453 — 02.03.01-19	5	5
RAI 453 — 02.03.04-13	6	6

To provide additional time to interact with the NRC staff and address their concerns, a revised schedule is provided below (bolded dates have changed) for the remaining 4 questions.

Question #	Response Date
RAI 453 — 02.03.04-10	February 14, 2011
RAI 453 — 02.03.04-11	**January 28, 2011**
RAI 453 — 02.03.04-12	**January 28, 2011**
RAI 453 — 02.03.05-9	February 14, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: BRYAN Martin (External RS/NB)
Sent: Monday, December 06, 2010 5:10 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); WILLIFORD Dennis (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 453, FSAR Ch. 2, NEW PHASE 4 RAI

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 453 Response US EPR DC.pdf," provides a schedule since technically correct and complete responses to the 8 questions are not provided.

The following table indicates the respective pages in the response document, "RAI 453 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 453 — 02.03.01-17	2	2
RAI 453 — 02.03.01-18	3	3
RAI 453 — 02.03.01-19	4	4
RAI 453 — 02.03.04-10	5	5
RAI 453 — 02.03.04-11	6	6
RAI 453 — 02.03.04-12	7	8
RAI 453 — 02.03.04-13	9	9
RAI 453 — 02.03.05-9	10	10

The schedule for technically correct and complete responses to these questions is provided below.

Question #	Response Date
RAI 453 — 02.03.01-17	January 14, 2011
RAI 453 — 02.03.01-18	January 14, 2011
RAI 453 — 02.03.01-19	January 14, 2011
RAI 453 — 02.03.04-10	February 14, 2011
RAI 453 — 02.03.04-11	January 14, 2011
RAI 453 — 02.03.04-12	January 14, 2011
RAI 453 — 02.03.04-13	January 14, 2011
RAI 453 — 02.03.05-9	February 14, 2011

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Friday, November 05, 2010 8:55 AM
To: ZZ-DL-A-USEPR-DL
Cc: Harvey, Brad; Brown, David; Patel, Jay; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 453(5109, 5110,5111), FSAR Ch. 2, NEW PHASE 4 RAI

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on October 25, 2010, and on November 2, 2010, 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: 2377

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Subject: Response to U.S. EPR Design Certification Application RAI No. 453, FSAR Ch. 2, NEW PHASE 4 RAI, Supplement 1
Sent Date: 12/16/2010 3:33:02 PM
Received Date: 12/16/2010 3:33:10 PM
From: BRYAN Martin (EXTERNAL AREVA)

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MESSAGE	4497	12/16/2010 3:33:10 PM
RAI 453 Supplement 1 Response US EPR DC.pdf	168803	

Options
Priority: Standard
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Reply Requested: No
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Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 453(5109, 5110, 5111), Supplement 1, Revision 1

11/05/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 02.03.01 - Regional Climatology
SRP Section: 02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases
SRP Section: 02.03.05 - Long-Term Atmospheric Dispersion Estimates for Routine Releases

Application Section: FSAR Chapter 2

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

Question 02.03.01-17:

OPEN ITEM

NEW PHASE 4 RAI

This question is related to the applicant's response to RAIs 02.03.01-12 and 02.03.01-15. The staff wishes to clarify the criterion for listing site parameters in FSAR Tier 1, Table 5.0-1 and FSAR Tier 2, Table 2.1-1, as well as ask the applicant to revise the FSAR to clarify other details related to winter precipitation loads as presented in Revision 2 to the FSAR.

a. Consider replacing all six winter precipitation site parameters listed in Revision 2 to FSAR Tier 1, Table 5.0-1 and FSAR Tier 2, Table 2.1-1 with one site parameter, "Sum of normal winter precipitation event and extreme frozen winter precipitation event ground load: 143 psf." Consider adding a footnote to this new site parameter in FSAR Tier 1, Table 5.0-1 and FSAR Tier 2, Table 2.1-1 stating that the effect of the extreme liquid winter precipitation event on roof loads is negligible due to the lack of parapets.

   The discussion in FSAR Tier 2, Section 3.8.4.3.1 states that the normal design live load due to rain, snow, and ice includes the weight of the normal winter precipitation event and the weight of the extreme winter precipitation event. Therefore, it is appropriate to include just one site parameter that combines the weight of the normal winter precipitation event and the extreme winter precipitation event. Also, the intent of FSAR Tier 1, Table 5.0-1 and FSAR Tier 2, Table 2.1-1 is to list those site parameters (i.e., the postulated physical, environmental, and demographic features of an assumed site, such as ground snow loads) that are to be compared to a COL applicant's site characteristics pursuant to 10 CFR 52.79(d)(1). FSAR Tier 2, Table 5.0-1 and FSAR Tier 2, Table 2.1-1 need not contain the design characteristics (e.g., roof loads) resulting from the assumed site parameter values (e.g., ground loads).

b. Consider adding a reference to FSAR Tier 2, Section 2.3 in the precipitation section subtitle in FSAR Tier 2, Table 2.1-1.

c. Consider eliminating the discussion related to rain, snow, and ice loads from FSAR Tier 2, Section 2.4. This discussion better belongs in FSAR Tier 2, Section 2.3, as outlined in SRP 2.3.1 and ISG-07.

d. Consider clarifying in FSAR Tier 2, Section 3.8.4.3.1, that the design load related to rain, snow, and ice is based on a ground snow load of 143 lbs/ft^2 and that this corresponds to a roof load of 100 lbs/ft^2.

Response to Question 02.03.01-17:

a) The six winter precipitation site parameters listed in U.S. EPR FSAR Tier 1, Table 5.0-1, and in U.S. EPR FSAR Tier 2, Table 2.1-1, will be replaced with one site parameter, "Sum of normal winter precipitation event and extreme frozen winter precipitation event ground load: 143 psf." A footnote stating that the effect of the extreme liquid winter precipitation event on roof loads is negligible due to the lack of parapets will also be added to this new site parameter in U.S. EPR FSAR Tier 1, Table 5.0-1, and Tier 2, Table 2.1-1. Since U.S. EPR FSAR Tier 2, Section 2.3.1 lists the contents of Tier 2, Table 2.1-1, it will also be revised to list the new site parameter.

b) The Precipitation subheading in U.S. EPR FSAR Tier 2, Table 2.1-1 will be revised to add a reference to U.S. EPR Tier 2, Section 2.3 in addition to the existing reference to U.S. EPR Tier 2, Section 2.4.

c) The discussion of rain, snow, and ice loads will be removed from U.S. EPR FSAR Tier 2, Section 2.4. A cross-reference to this information provided in U.S. EPR FSAR Tier 2, Section 3.8.4.3.1 will also be revised to point to U.S. EPR FSAR Tier 2, Section 2.3 rather than Section 2.4.

d) The discussion in U.S. EPR FSAR Tier 2, Section 3.8.4.3.1, will be revised to clarify that the design load related to rain, snow, and ice is based on a ground load of 143 lbs/ft^2 and that this corresponds to a roof load of 100 lbs/ft^2.

FSAR Impact:

U.S. EPR FSAR Tier 1, Table 5.0-1, Tier 2, Table 2.1-1, Sections 2.3.1 2.4 and 3.8.4.3.1 will be revised as described in the response and indicated on the enclosed markup.

Question 02.03.01-18:

Follow-up to RAI 256, Question 02.03.01-13:

This question is related to the applicant's response to RAI 02.03.01-13. The staff finds the applicant's response to this RAI incomplete.

a. In order to be consistent with Footnote 2 to FSAR Tier 1, Table 5.0-1 and Footnote 3 to FSAR Tier 2, Table 2.1-1, consider revising FSAR Tier 2, Section 2.3.1.1, to state that the U.S. EPR zero percent exceedance air temperature site parameter values are based on conservative estimates of 100-year return period values and historic extreme values, whichever is bounding.

b. In order to be consistent with the definitions provided in 10 CFR 52.1, please justify why the first sentence in FSAR Tier 2, Section 2.3.1.1, should not be changed to read:

> The site 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.

Response to Question 02.03.01-18:

a) To be consistent with Footnote 2 of U.S. EPR FSAR Tier 1, Table 5.0-1 and Footnote 3 of U.S. EPR FSAR Tier 2, Table 2.1-1, U.S. EPR FSAR Tier 2, Section 2.3.1.1 will be revised to state that the U.S. EPR zero percent exceedance air temperature site parameter values are based on conservative estimates of 100-year return period values and historic extreme values, whichever is bounding.

b) To be consistent with the definitions provided in 10 CFR 52.1, the first sentence in FSAR Tier 2, Section 2.3.1.1, will be revised to replace the term "design parameters" with "site parameters" so that the revised text states: "The site 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."

FSAR Impact:

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

Question 02.03.01-19:

OPEN ITEM

NEW PHASE 4 RAI

COL Information Item 2.3-10 in FSAR Tier 2, Table 1.8-2, states that a COL applicant that references the U.S. EPR design certification will describe the means for proving 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. This same COL Information Item is presented in FSAR Tier 2, Section 2.3.1.2.

Please justify why this COL Information Item is associated with FSAR Tier 2, Section 2.3.1 (Regional Climatology) instead of FSAR Tier 2, Section 2.4.8 (Cooling Water Canals and Reservoirs). FSAR Tier 2, Section 2.4.8 is the section in the FSAR that is concerned with evaluating the design basis for cooling water canals and reservoirs used for makeup to the UHS cooling tower basins.

Response to Question 02.03.01-19:

As stated in the Response to RAI 351, Supplement 6, Question 09.02.05-29, which was submitted on November 4, 2010, COL Information Item 2.3-10 was deleted from U.S. EPR FSAR Tier 2, Section 2.3.1 and moved to Tier 2, Section 9.2.5.3, and was revised to require that the COL applicant confirm that the UHS makeup capacity is 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. A new COL Item, 9.2-8, was added to U.S. EPR FSAR Tier 2, Table 1.8-2. The Response to RAI 351, Supplement 6, Question 09.02.05-29 also notes that U.S. EPR FSAR Tier 2, Table 2.1-3 was relocated to Tier 2, Section 9.2.5 as Table 9.2.5-3—Design Values for Maximum Evaporation and Drift Loss of Water from the UHS.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Question 02.03.04-13:

OPEN ITEM

NEW PHASE RAI

COL Information Item 2.3-7 in FSAR Tier 2, Table 1.8-2 states that a COL applicant that references the U.S. EPR design will provide χ/Q values for each cumulative frequency distribution which exceeds the median value (50 percent of the time) as part of the assessment of the postulated impact of an accident on the environment. There are no U.S EPR site parameters related to these median χ/Q values (e.g., median χ/Q values are not used anywhere in the U.S. EPR FSAR) and they are not required to be presented in the COL FSAR by COL applicants. Consequently, please justify including COL Information Item 2.3-7 in FSAR Tier 2, Table 1.8-2.

Response to Question 02.03.04-13:

The 50 percent χ/Q values are used in the Calvert Cliffs 3 Environmental Report. Since these values are not used in the U.S. EPR FSAR, this COL Information Item, 2.3-7, will be deleted from U.S. EPR Tier 2, Table 1.8-2 and from U.S. EPR Tier 2, Section 2.3.4.

FSAR Impact:

U.S. EPR FSAR, Tier 2, Table 1.8-2 and Section 2.3.4 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

02.03.01-17a

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

Precipitation	
Parameter	**Value(s)**
Rainfall rate	≤19.4 in/hr
Sum of normal winter precipitation event and extreme frozen winter precipitation event ground load.~~Normal winter precipitation event ground load~~	≤143 psf[1] ~~≤100 psf~~
~~Normal winter precipitation event roof load~~	~~≤70 psf~~
~~Extreme liquid winter precipitation event roof load~~	~~0 psf [1]~~
~~Extreme frozen winter precipitation event ground load~~	~~≤43 psf (based on 55 inches)~~
~~Extreme frozen winter precipitation event roof load~~	~~≤30 psf~~
~~Extreme roof winter precipitation load~~	~~≤100 psf (100-year Mean Recurrence Interval)~~
Seismology	
Parameter	**Value(s)**
Horizontal SSE Acceleration	0.3g Peak for EUR and 0.21g Peak for HF (CSDRS shapes – See Figure 5.0-1)
Vertical SSE Acceleration	0.3g Peak for EUR and 0.18g Peak for HF (CSDRS shapes – See Figure 5.0-1)
Fault Displacement Potential	No fault displacement is considered for safety-related SSC in U.S. EPR design certification.
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)**
Design ambient temperature	The 0% exceedance maximum ambient temperature is 115°F Dry Bulb and 80°F Wet Bulb (mean coincident).[2] The 0% exceedance minimum ambient temperature is -40°F.[2] The 1% exceedance (seasonal basis)[3] maximum ambient temperature is 100°F Dry Bulb and 77°F Wet Bulb (mean coincident).

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

Atmospheric Dispersion Factors (χ/Q)	
Parameter	**Value(s)**
Meteorological Dispersion (values at Exclusion Area Boundary, and Low Population Zone at appropriate time intervals for short and long term)	Atmospheric dispersion factors – χ/Q (sec/m^3) – Exclusion Area Boundary 0 - 2 hours ≤ 1.00E-03 – Low Population Zone 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

02.03.01-17a

1. The effect of the extreme liquid winter precipitation event on roof loads is negligible due to the lack of parapets. ~~The maximum 48-hour PMWP liquid of 32 inches is based on data obtained from National Oceanic and Atmospheric Administration 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. By definition, 0% percent exceedance temperature values exclude peaks of temperatures that last less than two hours. The 0% percent exceedance values are based on conservative estimates of 100 year return period values and historic extreme values, whichever is bounding.

3. For maximum values, data from the summer months of June, July, and August are used. For minimum values, data from the winter months of December, January, and February are used.

Next File

Table 1.8-2—U.S. EPR Combined License Information Items
Sheet 3 of 39

Item No.	Description	Section
2.3-1	If a COL applicant that references the U.S. EPR design certification identifies site-specific meteorology values outside the range of the site 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
2.3-2	A COL applicant that references the U.S. EPR design certification will provide site-specific characteristics for regional climatology.	2.3.1
2.3-3	A COL applicant that references the U.S. EPR design certification will provide site-specific characteristics for local meteorology.	2.3.2
2.3-4	A COL applicant that references the U.S. EPR design certification will provide the site-specific, onsite meteorological measurement program.	2.3.3
2.3-5	A COL applicant that references the U.S. EPR design certification will provide a description of the atmospheric dispersion modeling used in evaluating potential design basis events to calculate concentrations of hazardous materials (e.g., flammable or toxic clouds) outside building structures resulting from the onsite and/or offsite airborne releases of such materials.	2.3.4
2.3-6	A COL applicant that references the U.S. EPR design certification will confirm that site-specific χ/Q values, based on site-specific meteorological data, are bounded by those specified in Table 2.1-1 at the EAB, LPZ and the control room. For site-specific χ/Q values that exceed the bounding χ/Q values, a COL applicant that references the U.S. EPR design certification will demonstrate that the radiological consequences associated with the controlling design basis accident continue to meet the dose reference values given in 10 CFR 50.34 and the control room operator dose limits given in GDC 19 using site-specific χ/Q values.	2.3.4
2.3-7	~~A COL applicant that references the U.S. EPR design will provide χ/Q values for each cumulative frequency distribution which exceeds the median value (50 percent of the time) as part of the assessment of the postulated impact of an accident on the environment.~~Deleted.	~~2.3.4~~Deleted
2.3-8	A COL applicant that references the U.S. EPR design certification will provide the site-specific, long-term diffusion estimates for routine releases. In developing this information, the COL applicant should consider the guidance provided in Regulatory Guides 1.23, 1.109, 1.111, and 1.112.	2.3.5

02.03.04-13

Table 2.1-1—U.S. EPR Site Design Envelope
Sheet 1 of 7

02.03.01-17b

U.S. EPR Site Design Envelope	
Precipitation (Refer to Sections 2.3 and 2.4~~Section 2.4~~)	
Rainfall rate	≤19.4 in/hr
Sum of normal winter precipitation event and extreme frozen winter precipitation event ground load.~~Normal winter precipitation event ground load~~	≤143 psf(1) ~~≤100 psf~~
~~Normal winter precipitation event roof load~~	~~≤70 psf~~
~~Extreme liquid winter precipitation event roof load~~	~~0 psf 1~~
~~Extreme frozen winter precipitation event ground load~~	~~≤43 psf (based on 55 inches)~~
~~Extreme frozen winter precipitation roof ground 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 for EUR and 0.21g Peak for HF (CSDRS shapes – See Section 3.7)
Vertical SSE Acceleration	0.3g Peak for EUR and 0.18g Peak for HF (CSDRS shapes – See Section 3.7)
Fault Displacement Potential	No fault displacement is considered for safety-related SSC in U.S. EPR design certification.

02.03.01-17a

Table 2.1-1—U.S. EPR Site Design Envelope
Sheet 7 of 7

U.S. EPR Site Design Envelope									
2–8 hours (s/m³)	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/m³)	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/m³)	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/m³)	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

1. The effect of the extreme liquid winter precipitation event on roof loads is negligible due to the lack of parapets. ~~The maximum 48-hour PMWP liquid of 32 inches is based on data obtained from National Oceanic and Atmospheric Administration 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. COL applicant to determine wet bulb temperature correction factor to account for potential interference and recirculation effects. (Refer to COL Item 2.0-1 in Table 1.8-2—U.S. EPR Combined License Information Items).
3. By definition, zero percent exceedance temperature values exclude peaks of temperatures less than two hours in duration. The zero percent exceedance temperature values are based on conservative estimates of 100-year return period values and historic extreme values, whichever is bounding.
4. For maximum values, data from the summer months or June, July, and August are used. For minimum values, data from the winter months of December, January, and February are used.
5. COL applicant to confirm potential UHS cooling tower interference effects on safety-related air intakes do not result in air intake inlet conditions that exceed the site design envelope ambient air conditions (refer to COL Item 2.0-1 in Table 1.8-2—U.S. EPR Combined License Information Items).

02.03.01-17a

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—U.S. EPR Site Design Envelope. If a COL applicant that references the U.S. EPR design certification identifies site-specific meteorology values outside the range of the site parameter 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

02.03.01-17a

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

- Sum of normal winter precipitation event and extreme frozen winter precipitation event ground load. ~~Weight of the normal winter precipitation event and the weight of the extreme winter precipitation event.~~
- 100-year, 3-second gust wind speed.
- Tornado parameters.
- Dry bulb and wet bulb temperatures.

2.3.1.1 Basis for Meteorological Parameters

02.03.01-18b

The ~~design~~site 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 100-year return period values and historic extreme values, whichever is bounding. ~~historical high and low values for potential sites.~~

02.03.01-18a

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

For site-specific χ/Q values that exceed the bounding χ/Q values, a COL applicant that references the U.S. EPR design certification will demonstrate that the radiological consequences associated with the controlling design basis accident continue to meet the dose reference values given in 10 CFR 50.34 and the control room operator dose limits given in GDC 19 using site-specific χ/Q values.

A COL applicant that references the U.S. EPR design certification will provide a description of the atmospheric dispersion modeling used in evaluating potential design basis events to calculate concentrations of hazardous materials (e.g., flammable or toxic clouds) outside building structures resulting from the onsite and/or offsite airborne releases of such materials.

02.03.04-13

~~A COL applicant that references the U.S. EPR design will provide χ/Q values for each cumulative frequency distribution which exceeds the median value (50 percent of the time) as part of the assessment of the postulated impact of an accident on the environment.~~

2.3.5 Long-Term Atmospheric Dispersion Estimates for Routine Releases

A COL applicant that references the U.S. EPR design certification will provide the site-specific, long-term diffusion estimates for routine releases. In developing this information, the COL applicant should consider the guidance provided in RG 1.23, RG 1.109, RG 1.111, and RG 1.112. The maximum annual average χ/Q value at the site boundary, provided in Table 2.1-1, is used to calculate radionuclide concentrations associated with routine gaseous effluent releases, addressed in Section 11.3 11.3, for comparison with environmental release limits and dose limits given in 10 CFR 20. If a reactor site has an annual average χ/Q value that exceeds the reference value, then a site-specific evaluation will be performed.

A COL applicant that references the U.S EPR design certification will also provide estimates of annual average atmospheric dispersion (χ/Q values) and deposition (D/Q values) for 16 radial sectors to a distance of 50 miles from the plant as part of its environmental assessment.

2.3.6 References

1. EPRI ALWR Utility Requirements Document, “Electric Power Research Institute Advanced Light Water Reactor Utility Requirements Document,” Volume II-Revision 8, March 1999.

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.

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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.~~

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

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 failure of upstream and downstream water control structures are within the hydro-geologic design basis.

ANSI/AISC N690-1994 including Supplement 2 (2004) for steel structures (GDC 1, GDC 2, GDC 4, and GDC 5).

Other Seismic Category I structures are designed for the following loads, as described in Section 3.8.4.4:

Normal Loads

Normal loads are those loads encountered during normal plant operation, startup, shutdown, and construction (GDC 4). This load category includes:

- Dead loads (D)—Dead loads include the weight of the structure and any permanent equipment or material weights. Dead load effects also refer to internal moments and forces due to dead loads.

  For buried items, the dead load includes the weight of the soil overburden. The soil overburden load includes the weight of the overlying soil prism.

- Live loads (L)—Live loads include any normal loads that vary with intensity and point of application, including moveable equipment and precipitation loads. Live load effects also refer to internal moments and forces due to live loads. Live loads are applied, removed, varied from zero to full value, or shifted in location to obtain the worst-case loading conditions. Impact forces due to moving loads are applied for the loading condition.

  In general, a live load of 500 pounds per square foot is applied to FB concrete floors and a load of 175 pounds per square foot is applied to FB and SB steel grating floors and platforms. A live load of 300 pounds per square foot is applied to SB concrete floors. Finally, a live load of 100 pounds per square foot is applied to concrete floors, 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 a ground load of 143 pounds per square foot, which corresponds to a roof load of 100 pounds per square foot~~pounds/ft2 on the ground~~, as described in Section 2.3~~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. 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:

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