ClinchRiverESPHFNPEm Resource

From: Schiele, Raymond Joseph <rjschiele@tva.gov>
Sent: Friday, August 25, 2017 8:43 AM
To: Sutton, Mallecia
Subject: [External_Sender] Draft RAI 10
Attachments: CRNS ESP Draft RAI 10.pdf

Mallecia,

I have highlighted the subjects and placed comments in the margin to provide some insights on the specifics that TVA would like to discuss.

Thanks, Ray

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Draft Request for Additional Information, Number 10, eRAI-8969

Issue Date: 08/18/2017
Application Title: Clinch River Nuclear Site, ESP
Operating Company: Clinch River Nuclear Site, ESP
Docket No. 52-047
Review Section: 02.03.01 - Regional Climatology
Application Section: Regional Climatology

QUESTIONS

02.03.01

Regulatory Background

10 CFR 52.17(a)(1)(vi) states, in part, that an Early Site Permit application must contain the "meteorological . . . characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated." NUREG-0800, Standard Review Plan (SRP), Section 2.3.1, Regional Climatology, establishes criteria that the NRC staff uses to evaluate whether an applicant meets the NRC's regulations.

RAI Question 02.03.01-1

CRNS ESP Application SSAR Table 2.0-1 defines the "basic wind speed" site characteristic as the wind velocity at 33 feet above ground level associated with a 100-year return period and specifies a value of 96.3 mph for a 3-second gust.

CRNS ESP Application SSAR Section 2.3.1.3.2, "Extreme Winds," states that the "design basis wind speed" is based on data from ASCE 7-05. The SSAR determined that the 50-year return 3-second gust wind speed at 33 feet above the ground is 90 mph, which gives a "design basis 100-year return wind speed" of 96.3 mph after use of a conversion factor of 1.07.

Please address the following questions related to this SSAR section.

a) Please clarify whether the "design basis wind speed" site characteristic value discussed in SSAR Section 2.3.1.3.2 is intended to be the same as the "basic wind speed" site characteristic value presented in SSAR Table 2.0-1.

b) SSAR Section 2.3.1.3.2 states that the design basis wind speed site characteristic value of 96.3 mph is derived from ASCE 7-05, Figure 6-1, with a conversion factor of 1.07 used

to convert the ASCE value from a 50-year recurrence interval to a 100-year recurrence interval. ASCE 7-05 further notes that the basic wind speed values are 3-second gust wind speeds at 33 feet above ground for Exposure C category. Please update SSAR Table 2.0-1 and SSAR Section 2.3.1.3.2 to specifically identify what Exposure category, as defined in ASCE 7-05 Section 6.5.6.3, "Exposure Categories," is being applied to the Clinch River site.

02.03.01

Regulatory Background

10 CFR 52.17(a)(1)(vi) states, in part, that an Early Site Permit application must contain the meteorological characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and time in which the historical data have been accumulated. NUREG-0800, Standard Review Plan (SRP), Section 2.3.1, Regional Climatology, establishes criteria that the NRC staff uses to evaluate whether an applicant meets the NRC's regulations.

RAI Question: 02.03.01-2

SSAR Section 2.3.1.4, "Design Basis Dry- and Wet-Bulb Temperatures" provides a description of the data and methods used to compute the site characteristic ambient air temperatures provided in SSAR Table 2.0-1. Please address the following:

a) SSAR Table 2.0-1 identifies the Site Characteristic Ambient Air Temperatures, including the dry bulb and coincident wet bulb temperatures. Update SSAR Table 2.0-1 to identify if these temperatures represent the mean annual coincident wet-bulb temperature or the maximum annual coincident wet-bulb temperatures.

b) Using an NOAA National Climatic Data Center (NCDC) dataset from Chattanooga Lovell Airport from 1973-2016, the staff calculated a significantly higher (more conservative) 100-year return period mean coincident wet-bulb as compared to the applicant. Please update the SSAR to provide a summary of the method that was used to calculate the 100-year return period dry bulb and coincident wet-bulb temperatures, which are reported in the SSAR.

Regulatory Background

10 CFR 52.17(a)(1)(vi) states, in part, that an Early Site Permit application must contain the "meteorological . . . characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated." The cited regulation is based on General Design Criterion 2 in Appendix A to 10 CFR Part 50 which states, in part, that "structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena…without loss of capability to perform their safety functions."

NUREG-0800, Standard Review Plan (SRP), Section 2.3.1, Regional Climatology, establishes criteria that the NRC staff uses to evaluate whether an applicant meets the NRC's regulations. With respect to the assessment of normal and extreme winter precipitation events, the NRC staff issued Interim Staff Guidance document DC/COL-ISG-007 on June 23, 2009 (see ADAMS Accession No. ML091490565), to clarify the staff's position under SRP Acceptance Criterion (6) in Subsection II (Acceptance Criteria) of SRP Section 2.3.1 on identifying winter precipitation events as site characteristics and site parameters for determining normal and extreme winter precipitation loads on the roofs of Seismic Category 1 structures.

RAI Question: 02.03.01-3

SSAR Subsection 2.3.1.3.6.2, "Estimated Weight of the 100-Year Return Snowpack" discusses the meteorological data and the methods used to develop site characteristic values for the normal, extreme frozen, and extreme liquid winter precipitation events. In general, the applicant's evaluations of these climate-related design-basis events appear to follow only certain portions of the referenced Interim Staff Guidance in DC/COL-ISG-007. Please address the following issues:

a) To avoid confusion regarding the content of SSAR Subsection 2.3.1.3.6.2, the applicant should consider changing the title from "Estimated Weight of the 100-year Return Snowpack" to "Normal and Extreme Winter Precipitation Events."

b) In estimating three of the four components in DC/COL-ISG-007 that should be considered in determining the normal winter precipitation event (i.e., the historical maximum snowpack, the 100-year return period snowfall event, and the historical maximum snowfall event in the site region), the applicant appears to have only evaluated snowfall data recorded at first-order National Weather Service (NWS) stations in the general site region (see SSAR Subsection 2.3.1.3.6.2 and SSAR Table 2.3.1-2).

However, the NRC staff notes that there are numerous NWS cooperative network observing stations in the site region (nominally within a 50-mile radius of the site) and in Climate Division 1 (Eastern) for Tennessee with sufficiently long periods of record (POR) of snowfall measurements that could also reasonably represent conditions expected to occur at the proposed site. Therefore, consistent with SRP Section 2.3.1,

Subsection II (Acceptance Criteria), SRP Acceptance Criterion 6 (Para. 2) and the data resources cited there and in Section 1(a) of the Final Interim Staff Guidance in DC/COL-ISG-007, the applicant should either: (1) provide justification for using only first-order NWS stations in estimating these three components of the normal winter precipitation event, or (2) identify and account for, in the evaluation, snowfall measurements from a more representative sampling including other cooperative network stations in the site region.

c) Further, in estimating two of the four components discussed in DC/COL-ISG-007 that should be considered in determining the normal winter precipitation event (i.e., the 100-year return period snowfall event and the historical maximum snowfall event in the site region), it appears that the duration for the historical maximum snowfall event is based on "maximum 24-hour snowfalls for Chattanooga, Knoxville, and Oak Ridge". In addition, it's not clear from the discussion in SSAR Subsection 2.3.1.3.6.2 what duration for the 100-year return period snowfall event is used in the analysis, although its source is stated to be "U.S. Snow Climatology data provided by the National Climatic Data Center".

Section 1(a) of the Final Interim Staff Guidance in DC/COL-ISG-007 calls for the 100-year return period snowfall and the historical maximum snowfall events to be based on a two-day (48 hour) duration. The applicant should address the following:

(1) With respect to the 100-year return period snowfall event, confirm that the duration represents a two-day period. If not, revise accordingly or provide justification for the alternate analytical technique that was used (i.e., a different duration). The NRC staff notes that snowfall events in the site region have occurred over durations of two or more days. In addition, the staff has been aware that the NCDC's Snow Climatology website has been inactive for several years. Please provide a reference as to when the event totals reported for the Oak Ridge and Knoxville, TN stations were obtained and why other, potentially more representative, stations were apparently not considered.

(2) With respect to the historical maximum snowfall event, confirm that the duration represents a two-day period. If not, revise accordingly or provide justification for the alternate analytical technique that was used (i.e., a different duration).

d) The applicant estimated the 48-hour probable maximum winter precipitation (PMWP) by linearly interpolating between the 24- and 72-hour probable maximum (liquid) precipitation (PMP) plots for the combined months of January-February. The guidance in DC/COL-ISG-007 and SRP Section 2.3.1 indicates that "those months with the historically highest snowpacks" should be considered in determining the 48-hour PMWP. Although not stated, use of the PMP plots for January-February implies that the historically highest snowpacks occur during these months.

However, the NRC staff notes that climatological records for NWS cooperative observer network stations in the site region show that significant snowfall events have also occurred during the month of March (when the snow density may be greater) and that the resulting snow depths have persisted for several days. Based on this information, the applicant should provide justification for why the 24- and 72-hour PMPs for the month of March were not considered in estimating the extreme liquid winter precipitation event.

Further, the proposed site is located in a region shown on the PMP maps as "stippled". Section 7.1 of the cited reference for these maps (i.e., Hydrometeorological Report (HMR) No. 53) states that "[t]his stippling outlines areas within which the generalized PMP estimates might be deficient because detailed terrain effects have not been evaluated". The applicant should address to what extent the terrain might influence liquid precipitation events during the months of January through March such that the "generalized PMP estimates" might increase or decrease and, in turn, affect the estimated 48-hour PMWP value.

e) The applicant concludes its discussion in SSAR Subsection 2.3.1.3.6.2 by stating that "[b]ecause of the location of the site, almost all of this PMWP occurs as liquid and does not contribute to roof loading. Therefore, the structural roof loads that must be accommodated by plant design is only the weight of the maximum historic snowpack (15.3 psf)".

The ESP application does not specify a reactor design for the proposed site and consequently neither identifies any Seismic Category 1 structures associated with a design(s) nor the characteristics of those structures (e.g., provisions for roof drainage, shedding of accumulated snow), which would be evaluated in accordance with the guidance in DC/COL-ISG-007 and applicable sections under SRP Chapter 3.

Therefore, the applicant should either provide and/or reference sufficient information that justifies these statements of conclusion or, consistent with Section 2(b) of the Final Interim Staff Guidance in DC/COL-ISG-007, clarify Subsection 2.3.1.3.6.2 to indicate that:

- extreme winter precipitation event live roof loads are to be based on the roof load due to the normal winter precipitation event plus the roof load due to the extreme winter precipitation event, and

- the extreme winter precipitation event is to be based on the higher roof load resulting from either the extreme frozen winter precipitation event or the extreme liquid winter precipitation event, so that these site characteristic can be properly evaluated in determining Extreme Winter Precipitation Event Live Roof Loads in the COL application stage.

In SSAR Subsection 2.3.1.3.2, “Extreme Winds”, Paragraph 6, the applicant stated that the maximum observed hourly (wind speed) value for the CRN Site during 2011 to 2013 was “14.1 mph” (miles per hour). The same value was also reported in SSAR Table 2.3.1-1. However, in reviewing SSAR Subsection 2.3.2.1.1, “Winds”, the NRC staff noted that Paragraph 2 under the heading “Average Wind Direction and Wind Speed Conditions” states that “[t]he highest 10-m hourly average observed speed was 15.1 mph”.

The applicant should either reconcile this discrepancy or revise SSAR Subsections 2.3.1.3.2 and 2.3.2.1.1, as appropriate, to correct or clarify the differences between these two values.