CCNPP3COLA NPEmails

From: Arora, Surinder
Sent: Tuesday, August 11, 2009 9:59 AM
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Cc: CCNPP3COL Resource; Mazaika, Michael; Lauron, Carolyn; Colaccino, Joseph; Biggins, James; Simon, Marcia; Vrahoretis, Susan; Rycyna, John
Subject: CCNPP3 - DRAFT 142 (eRAI 2112)
Attachments: RAI 142 RSAC 2112.doc

Rob,

Attached is DRAFT RAI No. 142 (eRAI No. 2112). You have until August 28, 2009 to review it and decide whether you need a conference call to discuss it before the final issuance. After the call or after August 28, 2009, the RAI will be finalized and sent to you for response. You will then have 30 days to respond. In reviewing the draft RAI, please also review and confirm that the RAI does not contain any proprietary information.

Thanks.

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From: Arora, Surinder

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Request for Additional Information No. 142 (eRAI 2112)
(DRAFT)
8/11/2009

Calvert Cliffs Unit 3
UniStar
Docket No. 52-016
SRP Section: 02.03.01 - Regional Climatology
Application Section: 2.3.1.2.2

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

02.03.01-17

The design-basis winter precipitation load analysis as discussed in FSAR Section 2.3.1.2.2.12 (through Rev. 3, as proposed to be revised in the October 30, 2008 response to RAI No. 02.03.01-5) does not reflect the interim staff guidance in DC/COL-ISG-07, "Interim Staff Guidance on Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures," (ISG-07) for assessment of normal and extreme winter precipitation loads.

The Staff agrees with the approach used to determine the pre-adjusted 48-hour probable maximum winter precipitation (PMWP) estimate as discussed in the October 30, 2008 response to RAI No. 02.03.01-5 - that is, by determining the 48-hour value from a plot of the 6-hour, 24-hour, and 72-hour PMWP values provided in HMR No. 53.

However, it appears that the analysis of the 48-hour PMWP component of the extreme winter precipitation load is based on a not well substantiated assumption that only 25% of the 48-hour PMWP total combines with the 100-year return period ground snow load. Justification for this reduction of the estimated 48-hour PMWP value appears to be based on average (as opposed to extreme) temperature and precipitation statistics from a 6-year period of onsite data. Further, the Staff does not consider six years to be a climatologically representative length of record. Therefore, this analysis does not adequately demonstrate that the 48-hour PMWP total could not fall or that only 25% of that amount would combine with the 100-year return period ground snow load.

On December 8, 2008, NRC received a supplemental response to RAI No. 93 (see ML083430811) pertaining to FSAR Section 2.3.1 of the U.S. EPR Design Certification Application (DCA). In RAI No. 93, the NRC asked AREVA to specify and identify the normal and extreme liquid and frozen precipitation events used in the design of the roofs of safety-related structures developed in accordance with ISG-07, and, among other things, to provide a basis for the chosen site parameter values. The staff believes that AREVA's response to RAI No. 93 is in general conformance with ISG-07 and notes that it appears to take into consideration the limiting amount of the 48-hour PMWP that could be held by the roofs of safety-related structures (which is also offered as an alternative in the language of the 1975 Site Analysis Branch Position on Winter Precipitation Loads, as well as the current revision to SRP Section 2.3.1, and re-iterated in ISG-07).

As a result, the design-basis winter precipitation load analysis, as proposed to be revised in the October 30, 2008 response to RAI No. 02.03.01-5, is not consistent with

the more recent AREVA response to RAI No. 93 for FSAR Section 2.3.1 of the U.S. EPR DCA.

(a) Therefore, revise FSAR Section 2.3.1.2.2.12 of the COLA by developing site characteristics for normal and extreme winter precipitation roof loads that are consistent with the guidance in ISG-07, or by justifying an alternative. The guidance in ISG-07, with additional clarification, is summarized below

(1) Normal Winter Precipitation Event - to be input to the determination of the normal winter precipitation event roof load. Value selected should be the highest ground-level weight (load, in lbs/ft^2) from among the following:

- 100-year return period snowpack (more appropriately, ground snow load),
- historical maximum snowpack (snow depth),
- 100-year return period snowfall event (2-day snow depth), or
- historical maximum snowfall event in the site region (2-day snow depth).

ISG-07 indicates that an appropriate source for the 100-year return period snowpack is ASCE Standard No. 7-05. The Staff agrees with the applicant's development of the 100-year return period estimate from the 50-year mean recurrence interval snow load based on ASCE 7-05, as discussed in FSAR Section 2.3.1.2.2.12 (through Rev. 3, as proposed to be revised in the October 30, 2008 response to RAI No. 02.03.01-5).

ISG-07 also indicates that an appropriate source for the 100-year return period two-day snowfall event and the historical two-day maximum snowfall event is the National Climatic Data Center's (NCDC's) Snow Climatology website which includes observations from first-order National Weather Service (NWS) stations and NCDC cooperative network observing stations. In determining whether a snowfall event may be reasonably expected to occur at the site, the observations considered should not be limited to those made at only the few first-order National Weather Service (NWS) stations in the site region; nearby NCDC cooperative network stations should also be taken into consideration. Therefore, the applicant should ensure that the types of stations used to characterize the magnitude of maximum two-day snowfall events in the site area is consistent with ISG-07, or justify using an alternative approach. In either case, update COL FSAR Section 2.3.1.2.2.12 accordingly.

Regulatory Guide 1.206, Section C.I.2.3.2.1 calls for “long-term data from nearby reasonably representative locations (e.g., within 50 miles (80 km)) [of the site]”. The applicant may wish to consider long-term observations from NCDC cooperative network stations located in Calvert County, Maryland and other nearby Maryland counties such as St. Mary’s, Dorchester, and Talbot, which include, among others, Solomons; Patuxent River Naval Air Station; Prince Frederick 1N; Mechanicsville 5NE; Blackwater Refuge; Cambridge 4W; Owings Ferry Landing; Cambridge Water Treatment Plant; and Royal Oak 2SSW.

Finally, ISG-07 identifies appropriate sources of historical maximum snowpack (snow depth) and other snowfall data, including Local Climatological Data (LCD) summaries, the Climatography of the U.S. No. 20 (CLIM20) series, NCDC Daily Surface Data (TD3200/3210), and NCDC's on-line "Storm Events" data base. However, data taken from any one of these sources should be corroborated by data from another source that

contains data for the same weather element. Also, the following limitations in the CLIM20 summaries and NCDC “Storm Events” on-line database should be noted:

- snowfall extremes in the CLIM20 series summaries are limited to only the current 30-year normal period (currently 1971-2000); and
- the "Storm Events" on-line data base is not currently populated with observations prior to 1993 (NCDC's hardcopy monthly "Storm Data" report covers the period back to 1959).

Historical snow depth data are also available on NCDC's Snow Climatology web site.

(2) Extreme Frozen Winter Precipitation Event - to be considered, if applicable (i.e., a greater load than contributed by the extreme liquid precipitation event), in the determination of the extreme winter precipitation event roof load. The value selected should be the higher ground-level weight (load, in lbs/ft^2) between:

- the 100-year return period snowfall event (2-day snow depth), and
- the historical maximum snowfall event in the site region (2-day snow depth),

developed as discussed above for these two-day duration events.

(3) Extreme Liquid Winter Precipitation Event - to be considered, if applicable (i.e., a greater load than contributed by the extreme frozen precipitation event), in the determination of the extreme winter precipitation event roof load. This value is the weight (load, in lbs/ft^2) of the 48-hour PMWP that is physically possible over a 10-square mile area at a particular geographical location during those months with the historically highest snowpacks (snow depths), where the pre-adjusted 48-hour PMWP is developed as discussed in the October 30 response to RAI No. 02.03.01-5.

(b) Pursuant to NUREG-0800, SRP Section 2.3.1, Section I (Areas of Review), Item 6, provide cross-references to any FSAR sections that utilize this design basis winter precipitation load information.

02.03.01-18

The National Climatic Data Center (NCDC) "Storm Events" on-line data base is not currently populated with observations prior to 1993 for snow storms, although the output header from queries for these severe weather events indicates (incorrectly) that the period of record extends from January 1, 1950 to date. Without that knowledge and with no qualification statement in the text of COL FSAR Section 2.3.1.2.2.10 (Snow Storms), the inference is that no such events occurred prior to the earliest date returned from the query. The staff acknowledges that the text in Section 2.3.1.2.2.10 correctly identifies the range of dates covered by the "Storm Events" query and is consistent with corresponding COL FSAR Table 2.3-7.

However, the staff does not consider the actual period of record (POR) presented to be climatologically representative for these types of events because of the POR's relatively

short duration, and, more importantly, because (based on other NCDC records) significant snowfall events have been recorded several times in the site area prior to the earliest date returned by the query. Information on extreme snowfall events in the site area provides context for evaluating whether the data considered in developing the site characteristics for normal and extreme winter precipitation load analyses (in COL FSAR Section 2.3.1.2.2.12) is representative of conditions that might be expected to occur at the site.

(a) The applicant should expand the POR used to characterize the occurrence of snow storm events. The applicant may wish to consider, among others, the following NCDC-based data sources: the NCDC publication "Storm Data", which provides narrative coverage of severe weather events back to January 1959 (Ref. 8 in SRP Section 2.3.1); NCDC Daily Surface Data (TD3200/3210) (Ref. 17 in SRP Section 2.3.1); NCDC Climatography of the United States No. 20 (CLIM20); and Southeast Regional Climate Center Historical Climate Summaries for Maryland for identifying overall maximum observed 24-hour and/or maximum monthly snowfall totals; and the NCDC Climate Atlas of the United States (Ref. 5 in SRP Section 2.3.1) for the general variation of monthly maximum snowfall totals and annual maximum snowfall totals in the site region.

However, the staff cautions that data taken from any one of these sources should be corroborated by data from another source that contains data for the same weather element, making note that the snowfall extremes in the CLIM20 series summaries are limited to only the current 30-year normal period (currently 1971-2000).

(b) Regulatory Guide (RG) 1.206, Section C.I.2.3.2.1 calls for “long-term data from nearby reasonably representative locations (e.g., within 50 miles (80 km)) [of the site]”. In determining whether a snowfall event may be reasonably expected to occur at the site, the observations considered should not be limited to those recorded only in Calvert County, Maryland. Therefore, the applicant should expand the area used to characterize the occurrence of snow storm events, consistent with this guidance (i.e., within 50 miles of the site), or justify an alternative size area for the selection of reasonably representative locations for obtaining data. In either case, update COL FSAR Section 2.3.1.2.2.10 and any related table(s) accordingly.

(c) The applicant should also expand the area queried from the on-line NCDC "Storm Events" data base and observations extracted from the NCDC "Storm Data" publication beyond Calvert County, Maryland, consistent with the RG 1.206 guidance (i.e., within 50 miles of the site), or justify an alternative size area. In either case, COL FSAR Section 2.3.1.2.2.10 and any related table(s) should be updated accordingly. The applicant may wish to consider, among others, observations from nearby Maryland counties such as St. Mary's, Dorchester, and Talbot. Furthermore, in expanding the area for identifying any reasonably representative overall maximum 24-hour and monthly snowfall totals from among the NCDC-based data sources identified in part (a) of this question, the applicant should consider nearby NCDC cooperative observing network stations with long-term PORs, including, among others: Solomons; Patuxent River Naval Air Station; Prince Frederick 1N; Mechanicsville 5NE; Blackwater Refuge; Cambridge 4W; Owings Ferry Landing; Cambridge Water Treatment Plant; and Royal Oak 2SSW.

The National Climatic Data Center (NCDC) "Storm Events" on-line data base is not currently populated with observations prior to 1993 for ice storms, although the output header from queries for these severe weather events indicates (incorrectly) that the period of record extends from January 1, 1950 to date. Without that knowledge and with no qualification statement in the text of COL FSAR Section 2.3.1.2.2.9 (Ice Storms), the inference is that no such events occurred prior to the earliest date returned from the query. The staff acknowledges that the text in Section 2.3.1.2.2.9 correctly identifies the range of dates covered by the "Storm Events" query and is consistent with corresponding COL FSAR Table 2.3-6.

However, the staff does not consider the actual period of record (POR) presented to be climatologically representative for these types of events because of the POR's relatively short duration. Information on ice storm events in the site area provides context for evaluating whether the data considered in developing the site characteristics for normal and extreme winter precipitation load analyses (in COL FSAR Section 2.3.1.2.2.12) is representative of conditions that might be expected to occur at the site.

(a) The applicant should expand the POR used to characterize the occurrence of ice storm events. The applicant may wish to consider, among others, the following data sources: the NCDC publication "Storm Data", which provides narrative coverage of severe weather events back to January 1959 (Ref. 8 in SRP Section 2.3.1) and the NCDC Climate Atlas of the United States (Ref. 5 in SRP Section 2.3.1) for the general monthly variation of ice storm events in the site region.

(b) Regulatory Guide (RG) 1.206, Section C.I.2.3.2.1 calls for “long-term data from nearby reasonably representative locations (e.g., within 50 miles (80 km)) [of the site]”. In determining whether an ice storm event may be reasonably expected to occur at the site, the observations considered should not be limited to those recorded only in Calvert County, Maryland. Therefore, the applicant should expand the area used to characterize the occurrence of ice storm events, consistent with this guidance (i.e., within 50 miles of the site), or justify an alternative size area for the selection of reasonably representative locations for obtaining data. In either case, update COL FSAR Section 2.3.1.2.2.9 and any related table(s) accordingly.

For ice storm events queried from the on-line NCDC "Storm Events" data base and observations extracted from the NCDC "Storm Data" publication, the applicant may wish to consider, among others, observations from nearby Maryland counties such as St. Mary's, Dorchester, and Talbot Counties. These counties include several nearby NCDC cooperative observing network stations with long-term PORs.

02.03.01-20

The response to RAI No. 02.03.01-9, submitted on October 30, 2008 (see ML083100776) is generally acceptable regarding the proposed specific change to COL FSAR Table 2.0-1. However, the following clarification and corrections are still necessary:

- one additional clarification to the site parameter and site characteristic Importance Factor entries in Table 2.0-1, and;
- one correction to terminology in Table 2.0-1.

(a) Further Clarification of Importance Factor – Both RAI No. 02.03.01-9 and the October 30, 2008 response to it make the distinction between the Importance Factor for wind loads and the design wind speed conversion factor. The former is used to adjust the wind velocity pressure to different annual probabilities of being exceeded (in this case, an importance factor of 1.15 adjusts a 50-year return period value to a 100-year return interval). The latter factor (in this case, 1.07) adjusts the basic wind speed, a 3-second gust value associated with a 50-year recurrence interval, to a 100-year return period.

The site parameter and site characteristic wind speed values in the current version of COL FSAR Table 2.0-1 (Rev. 5) represent 50-year mean recurrence interval values. The 100-year return period wind speed value only appears in COL FSAR Section 2.3.1.2.2.15, presumably in response to the regulatory guidance in NUREG-0800 for SRP Section 2.3.1 (Section 1 (Areas of Review), Item 6 (d)) and in Section C.I.2.3.1.2, Item 4 of Regulatory Guide 1.206. The 100-year return period wind speed value does not appear in Table 2.0-1. Section 2.3.1.2.2.15 also presents the 50- to 100-year return period wind speed conversion factor.

FSAR Section 3.3.1.2 (Determination of Applied Wind Forces) of the U.S. EPR Design Certification Application (Rev. 1) provides the method for estimating the effective wind design velocity pressure using the basic wind speed. The non-tornado wind speed-related information presented in COL FSAR Table 2.0-1 is consistent with that methodology. Therefore, to help avoid confusion, clarify the parenthetical statements that accompany the Table 2.0-1 Importance Factor entries to indicate what this factor is used for (i.e., adjustment of the velocity pressure from a 50-year to a 100-year mean recurrence interval for safety- and quality-related structures).

(b) Correction of Terminology in COL FSAR Table 2.0-1 - The left-hand row designator for the wind-related site parameter and site characteristic entries in Table 2.0-1 (Page 2 of 4) reads "Maximum Sustained Speed". The site parameter and site characteristic values listed in this table represent 3-second gust wind speeds, a fundamentally different statistic. Correct the left-hand row designator to properly indicate the wind speed values being presented.