CCNPP3COLA PEmails

From: Arora, Surinder
Sent: Monday, August 24, 2009 10:13 AM
To: Poche, Robert; Jennifer.McQueeney@unistarnuclear.com; michael.stevenson@unistarnuclear.com
Cc: CCNPP3COL Resource; Colaccino, Joseph; Biggins, James; Mazaika, Michael; Lauron, Carolyn; Simon, Marcia; Vrahoretis, Susan
Subject: RAI No. 141 RSAC 2798.doc
Attachments: FINAL RAI 141 RSAC 2798.doc

Rob,

Attached please find the subject request for additional information (RAI). A draft of the RAI was provided to you on August 11, 2009. No conference call was requested to discuss this 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.

SURINDER ARORA, PE
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Hearing Identifier: CalvertCliffs_Unit3Cola_Public_EX
Email Number: 968

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Subject: RAI No. 141 RSAC 2798.doc
Sent Date: 8/24/2009 10:12:46 AM
Received Date: 8/24/2009 10:12:49 AM
From: Arora, Surinder

Created By: Surinder.Arora@nrc.gov

Recipients:
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Tracking Status: None
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Post Office: HQCLSTR01.nrc.gov

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MESSAGE	827	8/24/2009 10:12:49 AM
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Options
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Return Notification: No
Reply Requested: Yes
Sensitivity: Normal
Expiration Date:
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Request for Additional Information No. 141 (eRAI 2798)

8/24/2009

Calvert Cliffs Unit 3
UniStar
Docket No. 52-016
SRP Section: 02.03.01 - Regional Climatology
Application Section: 2.3.1.2.2.2

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

02.03.01-14

The Staff considered the Applicant's response to RAI Question No. 02.03.01-2 for the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 combined license (COL) Final Safety Analysis Report (FSAR) ("RAI Response"), submitted on October 30, 2008 (ML083100776), on the frequencies of tropical storms and hurricanes within 100 statute miles of Calvert County, Maryland. The following items need to be addressed to fully resolve the Staff's concerns regarding revised Paragraph 3 of CCNPP Unit 3 FSAR Section 2.3.1.2.2.2, as revised in the RAI Response:

- the consideration of tropical cyclone events was limited to those events that were classified as hurricanes or tropical storms; the absence of tropical cyclone events just below the tropical storm wind speed criterion may result in underestimating high wind and rainfall statistics, and
- the use of the NOAA Coastal Services Center (NOAA-CSC) historical hurricane tracks online database was not consistent; this appears to have resulted in an undercount of events.

The Staff is concerned that extreme wind and/or precipitation (rainfall) events in the site area may not be fully considered because certain tropical cyclone events, specifically events other than those classified as hurricanes or tropical storms, may still be important in the analysis. The exclusion of these tropical cyclone events does not appear to meet the intent of the guidance in NUREG-0800, Standard Review Plan Section 2.3.1, Section I (Areas of Review (i.e., the extreme climatic conditions and regional meteorological phenomena that could affect the safe design and siting of the plant), or Regulatory Guide 1.206, Section C.I.2.3.1.2, Paragraph 2, (Sentence 1). The historical frequency of hurricanes, while identified specifically in the guidance, is a very important severe weather phenomenon; however, it should not be considered as the only criterion that affects the safe design and siting of the plant. For example, persistent and slow moving tropical cyclones could result in extreme precipitation events that are important in the analysis.

The Staff independently confirmed the tropical cyclone counts in Tables 1 and 2 of the RAI Response by querying by Place Name (for Calvert County) in the NOAA-CSC database. Regarding Table 3 of the RAI Response, the Staff's query of the NOAA-CSC database resulted in 28 events (64 line entries), but Table 3 lists only 19 of those events (39 line entries). The Staff believes that Hurricane Floyd; Tropical Storms Cindy and

Camille; Tropical Depressions Beryl and Dennis; Extra-Tropical Storms Hazel, Danny, and Charley; and, Sub-Tropical Depression Allison should be considered in the analysis.

Therefore, please address the following technical issues:

(a) Either (1) provide the rationale for excluding the 9 additional events identified by the Staff in the Table 3 query, or (2) confirm the frequency of tropical cyclone occurrences for the period of record 1950 to date as reported in Table 3 of the RAI Response using a consistent query type as was used in Tables 1 and 2 of the RAI Response and the Staff's independent confirmation.

(b) If Item (a) is addressed by confirming the frequency of tropical cyclone occurrences (Option 2 above), update CCNPP Unit 3 FSAR Section 2.3.1.2.2.2 and any related table(s) to include the frequencies of occurrence of all tropical cyclone classifications that occurred within 100 statute miles of Calvert County and determine whether or not the update changes the assessment of the design or siting of the plant considering extreme climatic conditions and regional meteorological phenomena. If Item (a) is addressed by providing a rationale for having excluded the nine additional tropical cyclone events identified by the Staff (Option 1 above), then update CCNPP Unit 3 FSAR Section 2.3.1.2.2.2 accordingly.

02.03.01-15

After considering the Applicant's response to RAI Question No. 02.03.01-2 for the CCNPP Unit 3 FSAR ("RAI Response"), submitted on October 30, 2008 (ML083100776), the Staff has a concern about the absence of a discussion of extreme wind conditions associated with tropical cyclone events that have occurred within 100 statute miles of Calvert County, Maryland. Tropical cyclone-related wind speeds may exceed the site characteristic 3-second gust wind speeds reported elsewhere in CCNPP Unit 3 FSAR Section 2.3.1 and Table 2.0-1 and may, therefore, represent the maximum wind speed (other than tornado) for consideration in the safe design and siting of the plant.

10 CFR 52.79(a)(1)(iii) states, in part, that a COL FSAR must identify 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, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The Staff has independently identified several tropical cyclone events that have occurred within 100 statute miles of Calvert County, Maryland over the 156-year period of record (1851 through 2006) queried from the NOAA-Coastal Services Center (NOAA-CSC) online database. These events include three unnamed hurricanes (Category 3 - in August 1879, Category 2 - in October 1878, and Category 1 - in October 1893) and a then-downgraded extra-tropical cyclone in October 1954 (formerly Hurricane Hazel, at times classified as a Category 4 and Category 3 storm). The maximum sustained wind speeds associated with these events are reported as 100, 90, 80, and 80 knots, respectively, and likely have 3-second gust wind speeds greater than the site

characteristic values of 101.7 miles per hour (mph) for the 100-year return period 3-second gust, as stated in CCNPP Unit 3 FSAR Section 2.3.1.2.2.15, and 95 mph for the 50-year return period 3-second gust, as stated in CCNPP Unit 3 FSAR Section 2.3.1.2.2.15 and Table 2.0-1.

The Staff notes that the hurricane with the highest sustained wind speed appears to have occurred on the perimeter of the 100-statute mile radial area and need not be considered further as it did not make landfall within this radial area. However, the hurricane with the second highest sustained wind (90 knots) was over land during its entire traverse of this radial area and its track was within about 40 miles of the CCNPP site. The Staff further notes that an observed gust of 110 knots was reported in the NCDC's International Station Meteorological Climate Summaries for the Patuxent River Naval Air Station (NAS) in October 1954.

The Applicant should address the following technical issues in order to fully resolve the Staff's concern that the site characteristic maximum wind speed (other than tornado) may not have been identified pursuant to 10 CFR 52.79(a)(1)(iii):

(a) Either (1) provide the rationale for excluding extreme wind speed events associated with the passage of tropical cyclones in the site area, or (2) determine the controlling site characteristic 3-second gust wind speed for the site and surrounding area by also taking into consideration extreme wind speed events associated with the passage of tropical cyclones in the site area and evaluating whether or not the magnitude of such events changes the assessment of the design or siting of the plant considering extreme climatic conditions and regional meteorological phenomena.

(b) In either case, update CCNPP Unit 3 FSAR Section 2.3.1.2.2.2, Section 2.3.1.2.2.15, and Table 2.0-1 accordingly. If a 3-second gust wind speed is estimated from a maximum reported sustained wind speed (e.g., from the NOAA-CSC database), then explain the method used to determine the estimated value.

02.03.01-16

The Staff considered the Applicant's response to RAI Question No. 02.03.01-2 for the CCNPP Unit 3 FSAR ("RAI Response"), submitted on October 30, 2008 (ML083100776), with respect to rainfall totals associated with the passage of tropical cyclones within 100 statute miles of Calvert County, Maryland. The following items need to be addressed to fully resolve the Staff's concerns regarding Paragraph 4 of CCNPP Unit 3 FSAR Section 2.3.1.2.2.2 (as originally stated) and Paragraphs 6 and 7 of the RAI Response:

- identification of precipitation (rainfall) totals for certain tropical cyclone events was limited to information only available in the National Climatic Data Center's (NCDC) on-line "Storm Events" database; and
- only tropical cyclone events that tracked within 100 statute miles of Calvert County, Maryland, appear to have been taken into account.

The Staff is concerned that the rainfall totals may be understated because the NCDC "Storm Events" database is not currently populated with precipitation observations prior

to 1993 although the output header for queries of these events indicates (incorrectly) that the period of record (POR) extends from January 1, 1950 to date. The Staff believes that the number of tropical cyclone events that produced extreme amounts of rainfall in the site area may be understated as well. These types of information provide context for the relationships between synoptic-scale processes and meteorological conditions in the site area consistent with Regulatory Guide (RG) 1.206 (Section C.I.2.3.1.1 and Section C.I.2.3.2.1, Item 3) and NUREG-0800, Standard Review Plan (SRP) Section 2.3.1, Section I (Areas of Review), Item 1, and perspective on the reasonability of the design basis rainfall site parameter and site characteristic values in CCNPP Unit 3 FSAR Section 2.4 and Table 2.0-1.

Based on the NCDC's TD3200/3210 (Surface Summary of the Day) data files and information available on-line from the Southeast Regional Climate Center (SERCC) for the State of Maryland at http://www.sercc.com/climateinfo/historical/historical.html, the Staff was able to independently identify several significant and/or record 24-hour rainfall totals at observing stations within 25 miles of the site that were not identified in CCNPP Unit 3 FSAR Section 2.3.1.2.2.2, Paragraph 4 or elsewhere in FSAR Section 2.3. These extreme rainfall events were associated with the passage of tropical cyclones both within and beyond the 100-statute-mile radius around Calvert County, Maryland, and include:

- for tropical cyclones within 100 statute miles, several historical 24-hour record totals at nearby cooperative observing stations – 8.60 inches at the Blackwater Refuge and 7.43 inches at the Prince Frederick 1N stations due to Tropical Storm Connie; 8.10 inches at the Mechanicsville 5NE station due to then Extra-Tropical Cyclone Ernesto; and 7.90 inches at the Royal Oak 2 SSW station due to Hurricane Floyd; and

- for tropical cyclones beyond 100 statute miles, several significant 24-hour totals at nearby cooperative stations, including 10.30 inches at the Cambridge Water Treatment Plant (station record) and 7.40 inches at the Solomons station (second highest for that location) due to an unnamed Category 1 hurricane and tropical cyclone.

Therefore, the Applicant should address the following technical issues:

(a) Either (1) provide the rationale for excluding extreme rainfall events that occurred prior to 1993 and/or that are associated with tropical cyclone tracks farther than 100 statute miles from Calvert County, Maryland, or (2) identify historical tropical cyclone-related extreme rainfall events that have occurred in the site area, regardless of a storm's track within or beyond 100 statute miles of Calvert County, Maryland, using data sources that cover longer PORs.

(b) If Item (a) is addressed by identifying historical tropical cyclone-related extreme rainfall events that have occurred within or beyond 100 statute miles of Calvert County, Maryland (Option 2 above), expand the data resources evaluated beyond the limited "Storm Events" database. The applicant may wish to consider the following data sources, among others, in identifying extreme rainfall events in the site area:

- NCDC TD3200/3210 (Surface Summary of the Day) data files (Reference 17 in SRP Section 2.3.1);

- NCDC Climatography of the United States No. 20 (highest daily total rainfall limited to station's available digital record);
- SERCC (referred to previously, may have longer PORs than digitized in other NCDC products); and
- NCDC "Storm Data" monthly publication (predecessor to "Storm Events", provides narrative summaries of severe weather events beginning in January 1959) (Reference 8 in SRP Section 2.3.1).

If Item (a) is addressed by providing a rationale for having excluded extreme rainfall events that occurred prior to 1993 and/or that are associated with tropical cyclone tracks farther than 100 statute miles from Calvert County, Maryland (Option 1 above), then update CCNPP Unit 3 FSAR Section 2.3.1.2.2.2 accordingly.

(c) In determining whether an extreme rainfall event may be reasonably expected to occur at the Calvert Cliffs site (regardless of whether it is associated with the passage of a tropical cyclone), observations considered should not be limited to those recorded only in Calvert County. 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]". Therefore, update CCNPP Unit 3 FSAR Section 2.3.1.2.2.2 to provide tropical cyclone-related extreme rainfall data beyond Calvert County, Maryland, in accordance 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 CCNPP Unit 3 FSAR Section 2.3.1.2.2.2 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 rainfall totals from among the NCDC-based data sources identified in part (b) 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.