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UniStar
NUCLEAR ENERGY

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October 19, 2009

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ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3,
RAI No. 151, Regional Climatology

Reference: Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy), "FINAL RAI No. 151 RSAC 2719" email dated September 17, 2009

The purpose of this letter is to respond to the request for additional information (RAI) identified in the NRC e-mail correspondence to UniStar Nuclear Energy, dated September 17, 2009 (Reference). This RAI addresses Regional Climatology, as discussed in Section 2.3.1 of the Final Safety Analysis Report (FSAR), as submitted in Part 2 of the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 Combined License Application (COLA), Revision 6.

Enclosure 1 provides a schedule for our responses to RAI No. 151, Questions 02.03.01-21 through 02.03.01-27.

Enclosure 2 provides our responses to RAI No. 151, NRC Questions 02.03.01-21, 02.03.01-22 and 02.03.01-27; which include revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA.

Our responses to RAI No. 151, Questions 02.03.01-21, 02.03.01-22 and 02.03.01-27 do not include any new regulatory commitments. Our responses do not contain any sensitive or proprietary information.

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NRO

If there are any questions regarding this transmittal, please contact me at (410) 470-4205, or Mr. Michael J. Yox at (410) 495-2436.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on October 19, 2009

Greg Gibson

Enclosure 1): Response Summary for Request for Additional Information RAI No. 151, Regional Climatology, Calvert Cliffs Nuclear Power Plant Unit 3

Enclosure 2): Response to NRC Request for Additional Information RAI No. 151, Questions 02.03.01-21, 02.03.01-22 and 02.03.01-27, Regional Climatology, Calvert Cliffs Nuclear Power Plant, Unit 3

cc: Surinder Arora, NRC Project Manager, U.S. EPR Projects Branch
Laura Quinn, NRC Environmental Project Manager, U.S. EPR COL Application
Getachew Tesfaye, NRC Project Manager, U.S. EPR DC Application (w/o enclosure)
Loren Plisco, Deputy Regional Administrator, NRC Region II (w/o enclosure)
Silas Kennedy, U.S. NRC Resident Inspector, CCNPP, Units 1 and 2
U.S. NRC Region I Office

GTG/SFW/mdf

Enclosure 1

Response Summary for Request for Additional Information
RAI No. 151, Regional Climatology
Calvert Cliffs Nuclear Power Plant Unit 3

Summary of the expected submittal dates of responses to RAI No. 151 questions.

Question	Response Submittal Schedule
02.03.01-21	This Letter – Enclosure 2
02.03.01-22	This Letter – Enclosure 2
02.03.01-23	November 4, 2009
02.03.01-24	November 4, 2009
02.03.01-25	November 4, 2009
02.03.01-26	Question Not Issued
02.03.01-27	November 23, 2009

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Enclosure 2

Response to NRC Request for Additional Information
RAI No. 151 Questions 02.03.01-21, 02.03.01-22 and 02.03.01 27, Regional Climatology, Calvert Cliffs Nuclear Power Plant, Unit 3

RAI No. 151

Question 02.03.01-21

The Staff considered the response to RAI Question No. 02.03.01-8 for the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 COL FSAR, submitted on October 30, 2008 (ML083100776), which includes a discussion of meteorological conditions resulting in the potential for water freezing in the Ultimate Heat Sink (UHS) water storage facility. The Staff has the following concerns with revised Paragraph 14 of COL FSAR Section 2.3.1.2.2.13:

- the applicability of this discussion given COL Information Item 2.4-8 which states that a COL applicant referencing the U.S. EPR design certification will evaluate the potential for freezing temperatures that may affect the performance of the UHS makeup, including the potential for frazil and anchor ice, maximum ice thickness, and maximum cumulative freezing degree-days below freezing;
- the inconsistency with the more focused discussion in COL FSAR Section 2.4.7 regarding potential ice effects on several plant systems (including the UHS) that more closely follows the guidance in Regulatory Guide (RG) 1.27 (Ultimate Heat Sink for Nuclear Power Plants) and COL Information Item 2.4-8; and
- an unclear relationship of the temperature and wind data presented to determining freezing potential in the UHS-related water sources.

Therefore, the Applicant should address the following technical issues to fully resolve the Staff's concerns:

(a) Ice formation requires persistence of sub-freezing temperatures. Explain:

- the applicability of the selected parameters (i.e., coldest month wind speed and mean coincident dry-bulb temperature) considering that 1% (or any percentile) exceedance values represent discrete statistical values rather than persisting conditions;
- the applicability of a "mean coincident" dry-bulb temperature condition versus more extreme conditions;
- the relevance of a wind speed parameter given that the cooling tower basins are relatively enclosed structures; and
- the relationship between the selected parameters and the analysis in COL FSAR Section 2.4.7.6, which considers the parameter "accumulated freezing degree-days", as a means of representing persistence, in the context of estimating maximum surface ice thickness in the relatively open waters around the intake water structures.

(b) Resolve the discrepancy between the "coldest month" as specified in revised Paragraph 14 (i.e., December) and as defined and indicated (i.e., January) in the 2005 ASHRAE Handbook summary for the Patuxent River Naval Air Station, in the National Climatic Data Center's Climatography of the United States (No. 81) for that station, and in Table 2.3-56 of the COL FSAR based on onsite meteorological data.

(c) If not relevant to determining the freezing potential in the UHS-related water sources at the CCNPP3 site, consider deleting revised Paragraph 14 in COL FSAR Section 2.3.1.2.2.13. However, in any case, provide a cross-reference from COL FSAR Section 2.3.1.2.2.13 to

COL FSAR Sections 2.4.7.6 and/or 2.4.7.7, consistent with the guidance in RG 1.206, Section C.I.2.3.1.2, Paragraph 2 (Sent. 1).

Response

Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 FSAR 2.3.1.2.2.13, Paragraph 14, will be replaced in its entirety as shown in the COLA Impact portion of this response, to address RAI No. 151 Question 02.03.01-21.

COLA Impact

FSAR Section 2.3.1.2.2.13 will be revised as follows in a future revision of the COLA:

2.3.1.2.2.13 Conditions for Maximum Evaporation and Potential Water Freezing in the Ultimate Heat Sink

~~The meteorological conditions resulting in the potential for water freezing in the ultimate heat sink water storage facility should be below dry bulb temperature values and associated wind speeds. Using 30 years of meteorological data from Patuxent River NAS, Maryland, the coldest month (December) wind speed and mean coincident dry bulb temperature that are exceeded only 1% of the time are 24 mph (10.7 mps) and 32.3°F (0.2°C). The 0% exceedance minimum dry bulb temperature value is 0°F (-18° C).~~

Section 2.4.7 provides information regarding potential ice effects on the UHS and other plant systems. Historical ice formation is discussed in FSAR Section 2.4.7.4 of the CCNPP Unit 3 COLA and includes NIC ice charts. Ice events have not affected the operation of CCNPP Units 1 and 2. FSAR Section 2.4.7.5 provides a detailed discussion of frazil ice in the vicinity of CCNPP Unit 3. As noted in FSAR Section 2.4.7.5, frazil ice has not been observed in the intake structure of the existing CCNPP Units 1 and 2 since the start of operation. There is no public record of frazil ice obstructing other water intakes in the Chesapeake Bay. Surface ice sheets are discussed in FSAR Section 2.4.7.6 of the CCNPP Unit 3 COLA. This includes a discussion of the use of maximum accumulated freezing degree-days to estimate surface ice thickness. CCNPP Unit 3 FSAR Section 2.4.7.7 contains a detailed discussion of the effect of ice accumulation and preventive measures.

Question 02.03.01-22

The Staff agrees with the response to RAI Question No. 02.03.01-8 for the COL FSAR, submitted on October 30, 2008 (ML083100776), regarding the removal from the discussion in COL FSAR Section 2.3.1.2.2.13 of:

- the monthly 2% and 0.4% exceedance wet-bulb and mean coincident dry-bulb temperature values; and
- the 100-year return period maximum and minimum dry-bulb temperature values, the maximum wet-bulb temperature coincident with the 100-year return period maximum dry-bulb temperature, and the 100-year return period maximum non-coincident wet-bulb temperature,

on the basis that these values are not applicable to the Ultimate Heat Sink (UHS) design, and that 0% exceedance values will be introduced in their place.

However, the Staff is unclear about the applicability of some of the remaining temperature characteristics to the UHS design. To fully resolve this concern, the Applicant should address the following related issues:

(a) The text, as proposed to be revised, includes a statement of the highest monthly (July) 1% design wet-bulb and mean coincident dry-bulb temperature values (i.e., 80 °F and 89.5 °F, respectively). If applicable, explain the relevance of these site characteristic values to the UHS design, identify the corresponding site parameter values, and discuss the criteria used to conclude whether these site characteristic values are enveloped by the site parameter values. If retained, confirm whether these 1% exceedance values are based on data for the updated 1978 to 2007 period of record for the Patuxent River Naval Air Station and ensure consistency with the 1% exceedance values in revised FSAR Section 2.3.1.2.2.16, as appropriate.

(b) The response refers to Section 2.3.1.1 of the U.S. EPR FSAR for justification, indicating that the 100-year return values are not used in the design of the UHS. The Staff finds no such statement in the cross-referenced section.

Response

(a) The 1% design wet-bulb and mean coincident dry-bulb temperature values were not used in the design of the UHS. This information will be removed from Section 2.3.1.2.2.13.

(b) FSAR Section 9.2.1.1 indicates that the 0% exceedance temperature values are used in the design of the UHS. The 100-year return values are not used in the design of the UHS.

COLA Impact

FSAR Section 2.3.1.2.2.13 will be revised as follows in a future revision of the COLA:

2.3.1.2.2.13 Conditions for Maximum Evaporation and Potential Water Freezing in the Ultimate Heat Sink

The U.S. EPR FSAR also states that the design of the UHS is based on a consideration of air temperature data listed in U.S. EPR FSAR Table 2.1-1. Site-specific values for these parameters were determined using 30 years (1978-2007) of meteorological data from Patuxent River Naval Air Station (NAS), Maryland, a nearby representative site (NCDC, 2008). The 0% exceedance[a] maximum dry bulb and coincident wet bulb temperature values are 102°F (39°C) and 80°F (27°C), respectively. The 0% exceedance non-coincident maximum wet bulb temperature value is 85°F (29°C). ~~The highest monthly (July) 1% design values are 80°F (27°C) and 89.5°F (31.9°C) for the wet and mean coincident dry bulb temperatures, respectively.~~ The hourly data set for the NAS (1987-2007) did not include wet-bulb temperature values. Wet-bulb temperature values were determined using the provided temperature, dew-point temperature, and atmospheric pressure hourly values and an algorithm from the National Weather Service. Observations that had valid values for ambient temperature, dew-point temperature, and atmospheric pressure were used in the analysis. The U.S. EPR FSAR design values listed in Table 2.1-1 bound the calculated values for CCNPP Unit 3 listed above except for the 0% exceedance non-coincident wet bulb temperature value. This comparison is shown in FSAR Table 2.0-1. The acceptability of the 0% exceedance non-coincident wet bulb temperature design value is described in FSAR Section 9.2.1.1.

[a] The definition of the maximum/minimum zero percent exceedance temperature values is the highest/lowest value that can occur for consecutive hours (two or more) and can only be exceeded one hour at a time (i.e., no consecutive hourly temperature values can exceed it).