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UniStar
NUCLEAR ENERGY

10 CFR 50.4
10 CFR 52.79

August 19, 2010

UN#10-231

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 250, Question 02.03.01-34, Regional Climatology

Reference:
1) Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy), "FINAL RAI 250 RSAC 4777" email dated June 23, 2010

2) UniStar Nuclear Energy Letter UN#10-218, from Greg Gibson to Document Control Desk, U.S. NRC, RAI 250, Question 02.03.01-34, Regional Climatology, dated August 6, 2010

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 June 23, 2010 (Reference 1). 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.

Reference 2 provided an August 19, 2010 schedule for the response to Question 02.03.01-34. The enclosure provides our response to RAI 250, Question 02.03.01-34, and includes revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA.

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NRO

Our response does not include any new regulatory commitments. This letter does not contain any sensitive or proprietary information.

If there are any questions regarding this transmittal, please contact me at (410) 470-4205, or Mr. Wayne A. Massie at (410) 470-5503.

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

Executed on August 19, 2010

Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI 250, Question 02.03.01-34, 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/RDS/jdc

Enclosure

Response to NRC Request for Additional Information
RAI 250, Question 02.03.01-34, Regional Climatology
Calvert Cliffs Nuclear Power Plant, Unit 3

RAI 250

Question 02.03.01-34

Title 10, CFR 52.79(d) states that the FSAR need not contain information or analyses submitted to the Commission in connection with the design certification, provided, however, that the FSAR must either include or incorporate by reference the standard design certification FSAR and must contain, in addition to the information and analyses otherwise required, information sufficient to demonstrate that the site characteristics fall within the site parameters specified in the design certification.

In FSAR Section 2.3, the applicant cites COL Information Item 2.3-1 from the U.S. EPR FSAR, which states:

- If a COL applicant that references the U.S. EPR design certification identifies site-specific meteorology values outside the range of the design 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 COL application.

The applicant addresses this item by stating that:

- The CCNPP Unit 3 site-specific meteorology values have been reviewed and compared to determine if they are within the bounds of the assumed meteorology values for a U.S. EPR. This comparison is provided in Table 2.0-1. The CCNPP Unit 3 site-specific meteorology parameters are within the bounds of the conservative limiting meteorology values presented in Table 2.0-1.

However, there are several site characteristic values that appear in Table 2.0-1 of Rev. 6 of the FSAR that are not bounded by the EPR site parameters: (1) the maximum non-coincident wet bulb temperature value for UHS design; (2) the maximum annual average atmospheric dispersion value; and (3) the 0-2 hour accident-related atmospheric dispersion value for the outer boundary of the low population zone. Part 7 of the application addresses the latter two departures and exemptions, but the first departure regarding the UHS design temperature value is not addressed in Part 7.

Please revise FSAR Section 2.3 to incorporate a revised response to COL Information Item 2.3-1, and revise Part 7 of the application to address the additional departure.

Response

COLA FSAR Table 2.0-1 will be updated to identify the departure from a design parameter in the U.S. EPR FSAR Table 2.1-1. The response to COL Information Item 2.3-1 will be updated to reflect the departure. COLA FSAR Section 9.2.1 will be updated to identify the departure and clarify its justification. Evaluation of the departure will be included in COLA Part 7 Section 1.1.

COLA Impact

FSAR Section 1.8.2 is being updated as follows:

1.8.2 DEPARTURES

The U.S. EPR FSAR includes the following COL Item in Section 1.8.2:

A COL applicant that references the U. S. EPR design certification will provide a list of any departures from the FSAR in the COL FSAR.

This COL Item is addressed as follows:

{The list of departures from the U.S. EPR FSAR is as follows:

Maximum Differential Settlement (across the basemat)	FSAR 2.5.4 and 3.8.5
Maximum Annual Average Atmospheric Dispersion Factor (0.5 mile - limiting sector)	FSAR 2.3.5
Accident Atmospheric Dispersion Factor (0-2 hour, Low Population Zone, 1.5 miles)	FSAR 2.3.4 and 15.0.3
In-Structure Response Spectra	FSAR 3.7.2.5.2
Toxic Gas Detection and Isolation	FSAR 3.11, 6.4, 9.4.1 and 14.2.12
Normal Power Supply System	FSAR 8.3.1.1.2
Minimum Shear Wave Velocity	FSAR 2.5.4.2.5.8 and COLA Part 10 ITAAC Table 2.4-1
Coefficient of Static Friction	FSAR 3.8.5.5
Maximum Non-Coincident Wet Bulb Temperature Value at 0% Exceedance (85°F)	FSAR 2.0, 2.3 and 9.2.1

Justification for these departures is presented in Part 7 of the COL application.}

FSAR Section 2.3 is being updated as follows:

2.3 METEOROLOGY

This section of the U.S. EPR FSAR is incorporated by reference with the following departures and supplements.

> If a COL applicant that references the U.S. EPR design certification identifies site-specific meteorology values outside the range of the design 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.

This COL Item is addressed as follows:

{The CCNPP Unit 3 site-specific meteorology values have been reviewed and compared to determine if they are within the bounds of the assumed meteorology values for a U.S. EPR. This comparison is provided in Table 2.0-1. The CCNPP Unit 3 site-specific meteorology parameters are within the bounds of the conservative limiting meteorology values presented in Table 2.0-1, except for the maximum non-coincident 0% exceedance wet bulb temperature described in Section 2.3.1.2.2.13. The acceptability for the use of this design value is included in Section 9.2.1.1.}

FSAR Table 2.0-1 is being updated as follows:

Table 2.0-1—{U.S. EPR Site Design Envelope Comparison}

	U.S. EPR FSAR Design Parameter Value/Characteristic			CCNPP Unit 3 Design Parameter Value/Characteristic
Missile Spectra	6 in Schedule 40 pipe, 6.625 in diameter x 15 ft long, 287 lb, 34.5 in^2 impact area, impact velocity of 135 ft/sec horizontal and 90 ft/sec vertical.			Design values are enveloped (See Section 2.2 and 3.5)
	Automobile, 16.4 ft x 6.6 ft x 4.3 ft, 4000 lb, 4086.7 in^2 impact area, impact velocity of 135 ft/sec horizontal & 90 ft/sec vertical. (Automobile missile is considered at elevations up to 30.0 ft above grade elevation.)			Design values are enveloped (See Section 2.2 and 3.5)
	Solid steel sphere, 1 in diameter, 0.147 lb, 0.79 in^2 impact area, impact velocity of 26 ft/sec horizontal & 17 ft/sec Vertical.			Design values are enveloped (See Section 2.2 and 3.5)
Temperature				
Air	0% Exceedance Values	Maximum	115°F Dry Bulb / 80°F Wet Bulb (coincident)	102°F Dry Bulb /80°F Wet Bulb (coincident) (See Section 9.2.1)
			81°F Wet Bulb (non-coincident) for UHS Design only	85°F Wet Bulb (non-coincident) ~~for UHS Design only~~ (See Section 9.2.1 for UHS Design) (note h)
		Minimum	-40°F	0°F (See Section 2.3.1)
	1% Exceedance Values	Maximum	100°F Dry Bulb / 77°F Wet Bulb (coincident)	95°F / 77.5°F
			80°F Wet Bulb (non-coincident) for UHS Design only	80°F
		Minimum	-10°F	32.3°F

Notes:
a. Value is a departure from a design parameter and is listed in Part 7 of the COL Application. Justification is provided in Chapter 3.
b. Value is a departure from a design parameter and is listed in Part 7 of the COL Application. Justification is provided Chapter 3.
c. Value is a departure from a design parameter and is listed in Part 7 of the COL Application. Justification is provided in Section 2.3.5.
d. Value is a departure listed in Part 7 of the COL Application. Justification is provided in Chapter 15.
e. The maximum 48-hour PMWP liquid of 32 inches is based on data obtained from NOAA 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 U.S. EPR roof loads is negligible, due to lack of parapets.
f. First value is U.S. EPR Design Parameter/Second value is CCNPP3 Site Specific Parameter.
g. The same meteorological data are used to calculate unfiltered χ/Q values. Since the site-specific control room χ/Q values were demonstrated to be bounded by the U.S. EPR χ/Q values, the calculation of the site-specific atmosphere dispersion factors for unfiltered inleakage was not necessary. CCNPP Unit 3 incorporates by reference the doses for the main control room presented in the U.S. EPR FSAR.
h. Value is a departure from a design parameter and is listed in Part 7 of the COLA Application. Justification is provided in Section 9.2.1.

FSAR Section 9.2.1 is being updated as follows:

9.2.1 ESSENTIAL SERVICE WATER SYSTEM

No departures or supplements.

9.2.1.1 Design Bases

{The temperatures in U.S. EPR FSAR Tables 2.1-3 and 2.1-4 envelope the temperature data for the Calvert Cliffs Site and are described below.

The CCNPP Unit 3 site-specific wet and dry bulb temperatures were determined using the guidance of Regulatory Guide 1.27 (NRC, 1976) and 30 years of climatology data (1976-2006) from Patuxent River Naval Air Station, just south of the site. The data analysis yielded a maximum calculated wet bulb temperature, when applying a 0% exceedance criterion, of 85°F (29°C) with a coincident dry bulb temperature of 99°F (37°C). This value is identified in Table 2.0-1 as a departure from the U.S. EPR site parameter envelope for the 0% exceedance non-coincident wet bulb temperature. This is justified because the cooling tower performance at its design point is analyzed for the worst case, time-dependent meteorological conditions noted below (including the highest recorded wet bulb temperature of 85°F (29°C)) and the similarly time-dependent DBA heat rejection curve. The 0% exceedance criterion means that the wet bulb temperature does not exceed the 0% exceedance value for more than two consecutive data occurrences, and the Patuxent River data was recorded hourly.

The Essential Service Water System (ESWS) cooling towers for CCNPP Unit 3 are designed in accordance with Regulatory Guide 1.27 guidance ~~and the requirements of U.S. EPR FSAR Table 2.1-1~~. The tower ~~size~~ design point is ~~thus~~ based on a wet bulb temperature of 81°F (27°C) ~~with a coincident 115° F (46°C) dry bulb temperature~~ at a specific heat load yielding a specific outlet water temperature. A 1°F increase was added for conservatism. ~~The wet bulb temperature includes a 1°F (0.5°C) addition for "interference" due to each pair of ESWS towers' close proximity to each other~~ The tower design point satisfies the supply water temperature requirement under limiting conditions as described below.

The ~~higher~~ wet bulb temperature ~~of 85°F (29°C)~~ is the controlling factor for establishing the tower basin water temperature because of the more limited ability of the ambient air to absorb heat energy in moving through the tower. Refer to Section 2.3.1.2.2.13 and the tabular comparison to U.S. EPR FSAR Table 2.1-4 for the worst case 24 hour meteorological period for ESWS cooling, which envelopes the site-specific highest wet bulb temperature of 85°F. Alternatively, the higher difference between wet and coincident dry bulb temperatures ~~(81°F (27°C) wet bulb coincident with 115°F (46°C) dry bulb)~~ indicates lower humidity and resultant higher evaporation rate, thus making this the controlling factor for determining both makeup water demand and required tower basin water volume. Refer to Section 2.3.1.2.2.13 and the tabular comparison to U.S. EPR FSAR Table 2.1-3 for the worst case 72 hour meteorological period for ESWS evaporation. In applying these factors to CCNPP Unit 3, the resulting maximum ESWS tower basin water temperature is less than the 95°F (35°C) worst-case design basis for the ESWS and the Component Cooling Water System (CCWS) heat exchangers. Based on the analysis of the Ultimate Heat Sink (UHS) System with local meteorological data, it has been determined that the maximum ESWS supply temperature is less than 95°F (35°C) and the maximum evaporative loss from a UHS cooling tower during the post-72 hour design basis accident condition is 225 gpm (852 lpm).}

COLA Part 7, Section 1.1 is being updated as follows:

1.1 DEPARTURES

This Departure Report includes deviations in the CCNPP Unit 3 COL application FSAR from the information in the U.S. EPR FSAR, pursuant to 10 CFR Part 52. The U.S. EPR Design Certification Application is currently under review with the NRC. However, for the purposes of evaluating these deviations from the information in the U.S. EPR FSAR, the guidance provided in Regulatory Guide 1.206, Section C.IV.3.3, has been utilized.

The following Departures are described and evaluated in detail in this report:

1. Maximum Differential Settlement (across the basemat)
2. Maximum Annual Average Atmospheric Dispersion Factor (0.5 mile – limiting sector)
3. Accident Atmospheric Dispersion Factor (0-2 hour, Low Population Zone, 1.5 miles)
4. Toxic Gas Detection and Isolation
5. Shear Wave Velocity
6. In-Structure Response Spectra
7. Normal Power Supply System
8. Coefficient of Static Friction
9. Maximum Non-Coincident Wet Bulb Temperature Value at 0% Exceedance (85°F)

COLA Part 7, Section 1.1.9 is being added after Section 1.1.8, Coefficient of Static Friction, as follows:

1.1.9 Maximum Non-Coincident Wet Bulb Temperature Value at 0% Exceedance (85°F)

Affected U.S. EPR FSAR Sections: Tier 2 Table 2.1-1, Section 2.3.1 and Section 9.2.5.

Summary of Departure:

The U.S. EPR FSAR Table 2.1-1 specifies a 0% exceedance non-coincident maximum wet bulb air temperature value of 81°F (27°C). The corresponding CCNPP Unit 3 value is 85°F (29°C), as shown in the CCNPP Unit 3 FSAR Table 2.0-1. Therefore, the U.S. EPR FSAR 0% exceedance non-coincident maximum wet bulb air temperature listed in Table 2.1-1 does not bound the corresponding value for CCNPP Unit 3.

Scope/Extent of Departure:

This Departure is identified in the CCNPP Unit 3, FSAR Table 2.0-1 and Section 2.3.1.2.2.13. The acceptability of the 0% exceedance non-coincident wet bulb temperature design value is included in FSAR Section 9.2.1.1.

Departure Justification:

The CCNPP Unit 3 site-specific wet and dry bulb temperatures were determined using 30 years of climatology data (1976-2006) from Patuxent River Naval Air Station, just south of the site. The data analysis yielded a 0% exceedance wet bulb temperature value of 85°F (29°C) with a coincident dry bulb temperature value of 99°F (37°C). The 0% exceedance criterion means that the wet bulb temperature does not exceed the 0% exceedance value for more than two consecutive data occurrences. (The Patuxent River data was recorded hourly.)

This Departure is justified because it is derived from local climatology data and because the cooling tower performance at its design point is analyzed for the worst case, time-dependent meteorological conditions noted in Section 9.2.1.1 (including the highest recorded wet bulb temperature of 85°F (29°C)) and the similarly time-dependent DBA heat rejection. The cooling tower performance satisfies the supply water temperature requirement under the most limiting conditions.

Departure Evaluation:

The cooling tower performance is analyzed considering the worst case combination of input parameters, which includes the time dependent meteorological conditions noted in Section 9.2.1.1 and the similarly time dependent DBA heat rejection. The tower design point is based on a wet bulb temperature of 81°F (27°C) at a specific heat load yielding a specific water temperature. A 1°F wet bulb temperature increase was added for conservatism. The wet bulb temperature is the controlling factor for establishing the tower basin water temperature because of the more limited ability of the ambient air to absorb heat energy in moving through the tower. This design point satisfies the supply water temperature requirement under limiting conditions as described in Section 9.2.1.1. Refer to Section 2.3.1.2.2.13 and the tabular comparison to U.S. EPR FSAR Table 2.1-4 for the worst case 24 hour meteorological period for ESWS cooling. Applying these factors to CCNPP Unit 3, the resulting maximum UHS tower basin water temperature is less than the 95°F (35°C) worst-case design basis for the Essential Service Water System (ESWS) and the Component Cooling Water System (CCWS) heat exchangers. Based on the analysis of the UHS System with local meteorological data, it has been determined that the maximum ESWS supply temperature is less than 95°F (35°C) (consistent with U.S. EPR FSAR Section 9.2.5).

Alternatively, the higher difference between wet and coincident dry bulb temperatures indicates lower humidity and a resultant higher evaporation rate, thus making this the controlling factor for determining the makeup water demand and the required tower basin water volume. The maximum evaporative loss from a UHS cooling tower after the 72 hour period following a design basis accident is 225 gpm (852 lpm). Accordingly, this Departure does not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific FSAR;

2. Result in more than a minimal increase in the likelihood of occurrence of malfunction of a structure, system, or component (SSC) important to safety and previously evaluated in the plant-specific FSAR;

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific FSAR;

4. Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the plant-specific FSAR;

5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific FSAR;

6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific FSAR;

7. Result in a design basis limit for a fission product barrier as described in the plant-specific FSAR being exceeded or altered; or

8. Result in a departure from a method of evaluation described in the plant-specific FSAR used in establishing the design bases or in the safety analyses.

This Departure does not affect resolution of a severe accident issue identified in the plant-specific FSAR.

Therefore, this Departure has no safety significance.