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UniStar
NUCLEAR ENERGY

10 CFR 50.4
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August 26, 2011

UN#11-238

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. 310, Other Seismic Category I Structures

Reference:
1) Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy), "FINAL RAI 310 SEB2 5746, dated June 9, 2011

2) UniStar Nuclear Energy Letter UN#11-240, from Greg Gibson to Document Control Desk, U.S. NRC, RAI Closure Plan, dated August 23, 2011

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 9, 2011 (Reference 1). This RAI addresses Other Seismic Category I Structures, as discussed in Section 3.8 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 7.

Reference 2 provided a schedule for the response date for Question 03.08.04-27. The enclosure provides our response to RAI No. 310, Question 03.08.04-27 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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NRD

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 26, 2011

for Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI No. 310, Question 03.08.04-27, Other Seismic Category I Structures, 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)
Charles Casto, 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/AJF/mdf

Enclosure

Response to NRC Request for Additional Information
RAI No. 310, Question 03.08.04-27,
Other Seismic Category I Structures,
Calvert Cliffs Nuclear Power Plant, Unit 3

RAI No. 310

Question 03.08.04-27

The staff reviewed the RAI response to Question 03.08.04-2 provided in UniStar Letter UN#10-193 dated July 23, 2010 (ML102100480) and found that the responses to Items 2 and 3 are adequate. However, the following information is needed to address Item 1 of the RAI.

Regarding the hurricane parameters and the calculation for wave pressure distributions, the staff reviewed Rev. 7 of CCNPP Unit 3 FSAR Section 3.8. The staff found Rev. 7 of FSAR Section 3.8.4.3.1 states that, "The wave pressures on the north and west walls (of the UHS Makeup Water Intake Structure) are calculated based on the breaking wave heights corresponding to the still water depths," while the RAI response indicated that wave pressures on the west and south walls were estimated based on corresponding applicable breaking wave heights. The staff requests that the applicant explain whether the wave pressures on all the exterior walls of UHS MWIS were estimated based on the breaking wave heights and revise the FSAR Section 3.8.4.3.1 accordingly.
The staff needs the information to be able to conclude in the SER that there is reasonable assurance that design loads for the site-specific Category I structures have been adequately addressed in the CCNPP Unit 3 FSAR.

Response

The North Wall adjacent to the Forebay, the South Wall at the opposite side of the Forebay, and the West Wall at the opposite side of the Chesapeake Bay, are only subject to the hydrostatic wave pressures, which are calculated based on the still water depths. On the other hand, the East Wall facing the Chesapeake Bay is subject to the breaking wave pressure (including the hydrostatic pressure), and the hydrodynamic wave pressure. The breaking-wave pressure was calculated for the section of the wall between the crest of the reflected wave and the ground elevation. Note that the crest of the wave is located at a distance 1.2 times above the still water elevation and the maximum breaking-wave pressure is at the still water elevation. The hydrodynamic pressure against the east wall was calculated based on the still water depth.

COLA Impact

FSAR Section 3.8.4.3.1 is being updated as follows:

3.8.4.3.1 Design Loads

{Design loads defined in the U.S. EPR FSAR Section 3.8.4.3.1 are applicable for the design of site-specific Seismic Category I structures, with the following exceptions:

- Live loads (L) - Design live load due to rain, snow and ice is based on the normal and extreme winter precipitation events described in Section 2.3.1.2.2.12.

- Soil loads and lateral earth pressure (H) - Static lateral soil pressure is calculated based on site-specific soil parameters and groundwater elevation. Design unit weight for the structural fill (95% Modified Proctor) used in the intake area is as follows:

    - Moist unit weight: 149 pcf

- Saturated unit weight: 153 pcf

Lateral earth pressure coefficients are defined in Table 2.5-58. A coefficient of 0.5 is used conservatively for the structural fill for at-rest condition. The groundwater table in the intake area is at about Elevation 3 ft. A normal surcharge load of 500 psf minimum is considered for calculating the lateral earth pressures. Lateral pressures due to compaction associated with structural fill are also considered.

- Safe shutdown earthquake (E') –
  - Site-specific SSE is defined in Section 3.7.1.1.1.1, which has a peak ground acceleration of 0.15 g, as shown in Figure 3.7-1.
  - Dynamic soil pressure: Effects of dynamic soil pressure on the intake structures are captured by the SSI analysis described in Section 3.7.2.4.
- Abnormal loads - Abnormal loads generated by a postulated high-energy pipe break accident are not applicable, since such pipes are not present in the subject structures.
- Operating basis earthquake (OBE) - OBE is defined in Section 3.7.1.1.1.1 and shown in Figure 3.7-6, which is essentially one-third of the site-specific SSE. As such, OBE loads are not explicitly considered for the design of the site-specific Seismic Category I structures.

Additional design loads for site-specific Seismic Category I structures include the severe and extreme environmental loads associated with the postulated standard project hurricane (SPH) and probable maximum hurricane (PMH) events, respectively.

The hurricane wave pressure on the exterior walls of the UHS Makeup Water Intake Structure is obtained using the methodology presented in Chapter 5 of ASCE 7-05 (ASCE, 2006). The total wave pressure is equal to the sum of hydrostatic pressure ~~and~~, hydrodynamic wave pressure, and breaking wave pressures. The hydrostatic pressure is calculated based on the storm surge still water level of 13.65 ft (4.16 m) and 17.6 ft (5.35 m) NGVD 29 for SPH and PMH, respectively. ~~The wave pressures on the north and west walls are calculated based on the breaking wave heights corresponding to the still water depths.~~ The North Wall adjacent to the Forebay, the South Wall at the opposite side of the Forebay, and the West Wall at the opposite side of the Chesapeake Bay, are only subject to the hydrostatic wave pressures, which are calculated based on the still water depths. On the other hand, the East Wall facing the Chesapeake Bay is subject to the breaking wave pressure (including the hydrostatic pressure), and the hydrodynamic wave pressure. The breaking-wave pressure was calculated for the section of the wall between the crest of the reflected wave and the ground elevation. Note that the crest of the wave is located at a distance 1.2 times above the still water elevation and the maximum breaking-wave pressure is at the still water elevation. The hydrodynamic pressure against the east wall was calculated based on the still water depth.

Concurrent hurricane wind speeds based on the 3 second wind gust at 32.8 ft (10 m) high are 110 mph (177 km/hr) and 195 mph (314 km/hr) for SPH and PMH, respectively. Conservatively, the concurrent hurricane wind pressure for design of site-specific Seismic Category I structures is based on the U.S. EPR standard design wind speeds of 145 mph (233 km/hr) and 230 mph

(370 km/hr), for SPH and PMH respectively, utilizing the procedures presented in Chapter 6 of ASCE 7-05 (ASCE, 2006).

Due to much higher grade elevation, structures in the powerblock area are not affected by the wave pressure associated with the postulated hurricanes. Concurrent hurricane wind loads are enveloped by the wind and tornado wind loads presented in the U.S. EPR FSAR Sections 3.3.1 and 3.3.2, respectively.

In addition, the UHS Makeup Water Intake Structure is designed to withstand a peak positive incident overpressure (due to postulated explosions) of at least 1 psi without loss of function based on the guidance in RG 1.91, Rev. 1 (NRC, 1978a).}