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UniStar
NUCLEAR ENERGY

10 CFR 50.4
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May 18, 2009

UN#09-131

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. 99, Probable Maximum Tsunami Flooding

Reference: John Rycyna (NRC) to Robert Poche (UniStar), "RAI No 99 RHEB 2090.doc (PUBLIC)" email dated April 16, 2009

The purpose of this letter is to respond to a request for additional information (RAI) identified in the NRC e-mail correspondence to UniStar Nuclear Energy, dated April 16, 2009 (Reference). This RAI addresses Probable Maximum Tsunami Flooding, as discussed in Section 2.4.6 of the Final Safety Analysis Report (FSAR), as submitted in Part 2 of the Combined License Application (COLA), Revision 4. The reference letter requested UniStar Nuclear Energy to respond to the RAI within 30 days.

The enclosure provides our response to RAI No. 99, Questions 02.04.06-1, 02.04.06-3 and 02.04.06-11, and includes revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes in a future revision of the COLA.

A schedule of response dates for the remaining questions will be provided by June 2, 2009.

There are no regulatory commitments identified in this letter.

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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 May 18, 2009

Greg Gibson

Enclosure Response for Request for Additional Information RAI No. 99, Questions 02.04.06-1, 02.04.06-3, 02.04.06-11, Probable Maximum Tsunami Flooding, Calvert Cliffs Nuclear Power Plant Unit 3

cc: John Rycyna, NRC Project Manager, U.S. EPR COL Application
Laura Quinn, NRC Project Manager, Environmental Projects Branch 2
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/jmm

Enclosure

**Response for Request for Additional Information RAI No. 99,
Questions 02.04.06-1, 02.04.06-3, 02.04.06-11, Probable Maximum Tsunami Flooding,
Calvert Cliffs Nuclear Power Plant Unit 3**

RAI No. 99

Question 02.04.06-1

Section C.I.2.4.6.1 of Regulatory Guide 1.206 (RG 1.206) provides specific guidance with respect to determination of Probable Maximum Tsunami Flooding. This includes a discussion of the generation of tsunami-like waves from hill-slope failures. Provide topographic and geologic maps and CCNPP site reconnaissance data used in the assessment of potential subaerial landslides near the site.

Response

Detailed descriptions of regional and site topography, physiography and geomorphology including site reconnaissance data are provided in Section 2.5.1 of the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 Final Safety Analysis Report (FSAR). The response to RAI Set No. 71 Question 02.05.01-31[1] provided detailed descriptions of the geologic site reconnaissance. Topographic elevations on the western shore of the Chesapeake Bay near the site are provided in the USGS topographic map for Cove Point[2] (USGS, 1987) referenced in Section 2.4.3.7 of the FSAR. Further discussion of potential erosion of the Chesapeake Bay shoreline is provided in FSAR Section 2.4.9. The response to Question 02.04.06-3 of RAI Set No. 99 contains a description of topographic maps used to evaluate potential subaerial landslides on the eastern shore of the Chesapeake Bay across from the CCNPP Unit 3 site.

COLA Impact

The COLA FSAR will not be revised as a result of this response.

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1 UniStar Nuclear Energy Letter #09-152 from Greg Gibson to Document Control Desk, "Response to Request for Additional Information for the RAI No. 71, Basic Geologic and Seismic Information RAI No. 72, Vibratory Ground Motion" dated April 15, 2009

2 Cove Point Quadrangle, Maryland, 7.5 Minute Series (Topographic); U.S. Department of the Interior, Geological Survey, Cove Point, MD; 38076–D4-TF-024; 1987.

Question 02.04.06-3

Section C.I.2.4.6.1 of Regulatory Guide 1.206 (RG 1.206) provides specific guidance with respect to determination of Probable Maximum Tsunami Flooding. This includes a discussion of the generation of tsunami-like waves from hill-slope failures. Provide a discussion in the updated FSAR of the topographic relief of the eastern side of Chesapeake Bay, opposite the CCNPP site, and the findings in Section 2.5 of the FSAR.

Response

USGS topographic maps of the eastern side of the Chesapeake Bay (USGS 1982a) (USGS 1982b) indicate that the eastern shore of the bay consists of low-lying mudflats preceded by a tidal flat at the shoreline. The maximum topographic elevation near the shoreline is approximately 2.3 m (7.5 ft) in National Geodetic Vertical Datum of 1929 (NGVD 29). A similar topographic description of the Chesapeake Bay eastern shore is also provided in Section 2.5.1. It is therefore unlikely that a subaerial landslide would occur in the eastern shore of the Chesapeake Bay.

COLA Impact

The second paragraph in FSAR Section 2.4.6.1 will be revised as follows in a future COLA revision:

2.4.6.1 Probable Maximum Tsunami

The potential of a subaerial landslide near the site was assessed with geological maps, topographic maps, and CCNPP site reconnaissance. Along the western shoreline of the Chesapeake Bay, slope failure has occurred and appears to be caused by erosion of the base of the cliffs that reach an Elevation of about 100 ft (30.5 m) NGVD 29 (National Geodetic Vertical Datum of 1929). This process has not resulted in the generation of tsunami-like waves in the Chesapeake Bay. Across from the CCNPP site, the eastern shore of the Chesapeake Bay, as shown on USGS topographic maps (USGS, 1982a) (USGS, 1982b), consists of nearly flat terrain, primarily of low and wide tidal flats with a maximum topographic elevation near the eastern shoreline of approximately 7.5 ft (2.3 m) NGVD 29. ~~The topographic data indicate that the cliffs along.~~ It is therefore evident that the eastern shore of the Chesapeake Bay, opposite the CCNPP site, would ~~are~~ not be subject to slope failure. ~~Hence it was concluded that the~~ If subaerial landslides near the site were to happen, they would ~~will~~ not trigger local tsunami-like waves in the Chesapeake Bay.

FSAR Section 2.4.6.12 will be revised to include the following new references in a future COLA revision:

Section 2.4.6.12 References

USGS, 1982a. Taylors Island Quadrangle, Maryland, 7.5 Minute Series Orthophotomap (Topographic), U.S. Department of the Interior, Geological Survey, Taylors Island, MD, N3822.5–W7615/7.5, 1982.

USGS, 1982b. Hudson Quadrangle, Maryland, 7.5 Minute Series Orthophotomap (Topographic), U.S. Department of the Interior, Geological Survey, Hudson, MD, N3830–W7615/7.5, 1982.

Question 02.04.06-11

Section C.I.2.4.6.4 of Regulatory Guide 1.206 (RG 1.206) provides specific guidance with respect to tsunami analysis. This includes providing a complete description of the analysis procedure used to calculate tsunami wave height and period at the site. Correct the typographical error in the first term of equation 2.4.6-2 in the updated FSAR.

Response

The first term of Equation 2.4.6-2 has a typographical error. The partial derivative with respect to time of the depth-averaged volume flux in the y direction will be replaced with the partial derivative with respect to time of the depth-averaged volume flux in the x direction.

COLA Impact

FSAR Equation 2.4.6-2 will be revised as follows in a future COLA revision:

Section 2.4.6.1 Governing Equations

~~$$\frac{\partial Q}{\partial t}+\frac{\partial}{\partial x}\left(\frac{P^2}{h}\right)+\frac{\partial}{\partial y}\left(\frac{PQ}{h}\right)+gh\frac{\partial \eta}{\partial x}+\frac{gn^2}{h^{7/3}}P\sqrt{P^2+Q^2}=0$$~~

$$\frac{\partial P}{\partial t}+\frac{\partial}{\partial x}\left(\frac{P^2}{h}\right)+\frac{\partial}{\partial y}\left(\frac{PQ}{h}\right)+gh\frac{\partial \eta}{\partial x}+\frac{gn^2}{h^{7/3}}P\sqrt{P^2+Q^2}=0$$