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NUCLEAR ENERGY

10 CFR 50.4
10 CFR 52.79

May 19, 2009

UN#09-123

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. 100, Floods

Reference: John Rycyna (NRC) to Robert Poche (UniStar), "RAI No 100 RHEB 2088.doc (PUBLIC)" email dated April 20, 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 April 20, 2009 (Reference). This RAI addresses Floods, as discussed in Section 2.4.2 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 4.

The enclosure provides our response to RAI No. 100, Question 02.04.02-1, 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. Our response to Question 02.04.02-1 does not include any new regulatory commitments.

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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 19, 2009

Greg Gibson

Enclosure: Response for Request for Additional Information RAI No. 100, Question 02.04.02-1, Floods, Calvert Cliffs Nuclear Power Plant Unit 3

cc: John Rycyna, NRC Project Manager, U.S. EPR COL Application
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)
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GTG/SFW/jmm

Enclosure

Response for Request for Additional Information
RAI No. 100, Question 02.04.02-1, Floods,
Calvert Cliffs Nuclear Power Plant Unit 3

RAI 100

Question 02.04.02-1

In order to assure that the locally-intense precipitation flood event will not adversely impact the Unit 3 safety-related SSCs, and that construction of Unit 3 will be compliant with 10 CFR 52.79(a)(31), the following additional information needs to be reflected in appropriate sections of the FSAR, as appropriate:

Clearly identify locations where supercritical flows are likely to occur. Also indicate locations where PMP-generated flood events produce velocities significantly larger than the design velocity for the channel bed material (i.e., where damage exceeding normal maintenance would result). For these locations, describe how failure of these drainage features will not degrade any structures related to safety.

Clearly identify locations where hydraulic jumps are likely to form during the flooding event and provide a description of fortification measures to ensure that hydraulic forces induced by the jumps do not erode or degrade conveyance of ditches.

If the hydraulic structures are expected to fail during the Probable Maximum Precipitation generated flood event, provide a description describing how failure will not degrade any structures related to safety.

Provide a detailed description of the lateral-structure flow simulated in the numerical model. Include details regarding the expected flow path, depth and velocity of flow, erosion control measures, and a list of buildings and structures that are intercepted along the flow path.

Provide a description of Administrative Controls or surveillance requirements to ensure the ditches remain clear of obstructions, the side-slopes remain stable, and that the site-drainage system will function as described in the FSAR considering the length of the Unit 3 licensing period.

Response

There are no drainage ditches on the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 site that have been identified to positively experience supercritical flows. The only locations with potential for supercritical flows are on the power block fill slope along the north and east ditches downstream from where storm runoff overtops the ditches during a local probable maximum precipitation (PMP) event. These overflows will sheet flow down the power block fill slope away from the power block area towards the Chesapeake Bay. Overflows have been simulated using lateral weirs in the HEC-RAS model. A discussion of the simulation results will be added as indicated to CCNPP Unit 3 Final Safety Analysis Report (FSAR) Section 2.4.2.3.

The maximum channel velocity in the power block drainage ditches is estimated to be 5.5 fps. The drainage ditches are to be protected with rip rap lining. Rip rap channel linings are sized and placed to be able withstand these velocities.[1] Therefore, local PMP-generated flood events would not produce velocities that exceed design limits for any drainage collection ditches. No

1 **USACE, 1994.** Hydraulic Design of Flood Control Channels, EM 1110-2-1601, U.S. Army Corps of Engineers, June 1994.

maintenance activities, beyond those normally associated with drainage systems are anticipated.

Because supercritical flows do not occur in any of the power block drainage ditches, hydraulic jumps are not expected to form during a local PMP flooding event. No hydraulic structures are expected to fail during the local PMP-generated flood event.

Establishment of administrative controls that ensure ditches remain clear of obstructions and side-slopes remain stable and the site-drainage system will function as described, are prescribed in a variety of regulations and permits. These permits are developed and issued in stages that follow the life-cycle of the plant from site preparation and construction, through end of operations and decommissioning.

A permit application for Calvert County, MD currently is currently being prepared for site development. This application for permit will illustrate how CCNPP Unit 3 will meet the requirements in Maryland Department of the Environment (MDE) "2000 Maryland Storm Water Design Manual, Volume 1 & 2." The anticipated delivery date of this plan to Calvert County is the 2nd Quarter of 2009 with approval anticipated in the 3rd Quarter of 2009.

CCNPP Unit 3 is required to obtain and maintain a National Pollution Discharge Elimination System (NPDES) Permit. Additionally, CCNPP Unit 3 is required to adhere to the 1994 Maryland Specifications for Soil Erosion and Sediment Control Regulations during construction.

Both MDE and the NPDES Permit require development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). SWPPP has provisions requiring both monitoring and maintenance to assure these systems continue to function properly.

COLA Impact

FSAR Section 2.4.2.3 will be supplemented as follows in a future COLA revision:

2.4.2.3 Effects of Local Intense Precipitation

The hydraulics of the East and North ditch junction require that the water level at the downstream (east) end of the North Ditch and the downstream (north) end of the East Ditch have the same starting water level and that the remaining flow in each ditch be close to zero (all flows have exited over the lateral weirs). The starting water level (Elevation 79.7 ft (24.3 m)) and hydraulic condition was determined by trial and error. The water levels at the various cross-sections along the North and Center Ditches during the local PMP are shown in Table 2.4-15.

Two adjacent lateral weirs were used to model the overflow out of the East ditch. The upstream weir between cross sections 1200 and 600 is about 575 feet in length and the downstream weir between cross sections 600 and 0 is about 600 feet in length. The flow out of the North ditch is modeled with a third lateral weir about 600 feet in length between cross sections 600 and 0. The flows entering the East and North ditches pass over the lateral weirs in the local PMP flood analysis.

The flow depths over the upstream East ditch lateral weir range from 1.1 ft (0.34 m) to 0.7 ft (0.21 m) with an average velocity over the weir of 2.4 ft/s (0.73 m/s) during the peak flow condition. The flow depths over the downstream lateral weir on the East ditch are fairly constant at about 0.7 ft (0.21m) with an average velocity of about 2.2 ft/s (0.67 m/s). The overflow from the lateral weirs will sheet flow down the eastern power block fill slope with a gradient of 3 (horizontal) to 1 (vertical) and continue as sheet flow before discharging to existing drainage into the Chesapeake Bay.

The flow depths over the North ditch lateral weir range from 0.8 ft (0.24 m) to 0.7 ft (0.21 m) with an average velocity of about 2.2 ft/s (0.67 m/s) during the peak flow condition. Once the flow from the North ditch passes over the lateral weir it will sheet flow down the northern power block fill slope and continue as sheet flow towards the north and east, eventually discharging to existing drainage to the Chesapeake Bay. The northern and eastern power block fill slopes are provided with rip rap protection sufficient to resist local PMP-generated peak flow velocities, which are estimated to be on the order of 10 ft/s (3 m/s), assuming normal depth condition and using a Manning's n of 0.035 to represent the rip rap surface.

Overflows from the East ditch and North ditch lateral weirs will not be intercepted by any building or structure related to CCNPP Unit 3.

The safety-related structures in the CCNPP Unit 3 power block consist of two UHS cooling towers located in the northwest corner, two UHS cooling towers located in the southeast corner, diesel generator buildings located north and south of the reactor complex and the reactor complex, which consists of the containment building, fuel building, and safeguards buildings. The locations of the buildings are shown on Figure 2.4-7. The entrances to each of these structures are located at or close to the grade slab elevation (Elevation 84.6 ft (25.8 m)) for each structure, with the exception of the UHS cooling towers, where the entrances are located 14 ft (4.3 m) above the grade slab elevation. Table 2.4-16 gives the entrance elevations at the various safety-related facilities and compares them with the PMP water levels near those facilities. The maximum computed PMP water level in the power block area is Elevation 81.5 ft (24.8 m). However, the maximum PMP water level associated with a safety-related structure is Elevation 81.5 ft (24.8 m) which is 3.1 ft (0.95 m) below the reactor complex grade slab at Elevation 84.6 ft (25.8 m).