Greg Gibson
Vice President, Regulatory Affairs

750 East Pratt Street, Suite 1600
Baltimore, Maryland 21202

UniStar
NUCLEAR ENERGY

10 CFR 50.4
10 CFR 52.79

August 11, 2010

UN#10-228

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 246, Circulating Water System

References: 1) Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy), "FINAL RAI 246 SBPB 4526" email dated May 28, 2010

2) UniStar Nuclear Energy Letter UN#10-197, from Greg Gibson to Document Control Desk, U.S. NRC, Response to RAI 246, Circulating Water System, dated July 23, 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 May 28, 2010 (Reference 1). This RAI addresses the Circulating Water System, as discussed in Section 10.4 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 31, 2010 schedule for the response for Question 10.04.05-4. The enclosure provides our response to RAI 246, Question 10.04.05-4, 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.

D096

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 11, 2010

Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI 246, Question 10.04.05-4, Circulating Water System, 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/mdf

Enclosure

Response to NRC Request for Additional Information RAI 246, Question 10.04.05-4, Circulating Water System, Calvert Cliffs Nuclear Power Plant, Unit 3

RAI 246

Question 10.04.05-4

This is a follow-up to RAI 127, Question 10.4.5-1:

To verify the CCNPP circulating water system (CWS) is in compliance with General Design Criteria (GDC) 4, the staff issued CCNPP - RAI 10.4.5-1 (RAI 127), in which the staff requested the applicant to provide additional information regarding the turbine building water level control and cooling tower and yard piping failure effects related to the CWS flood control. In its response to this RAI, in a letter dated February 4, 2010, the applicant provided additional information to address the staff's concerns in three subparts, which included: a) Potential flooding due to cooling tower basin wall collapse, b) Potential flooding due to CWS pipe failure in the yard, and c) Turbine building water level control.

The staff reviewed the RAI response and the COLA and found that additional information on the paths that the flood water would use to exit the turbine building in the event of a CWS failure, before the water level would rise to unsafe levels, is needed. In Section 10.4.5.3 of the COLA, it is stated that: "Flooding exiting the Turbine Building at grade is directed away from structures that house safety-related SSCs by site grading, so external flooding resulting from a failure in the CWS does not adversely affect safety related SSCs." To verify this statement, the locations of the water exiting the turbine building are needed. Therefore, as a follow-up to RAI 127, Question 10.4.5-1, the staff requests the applicant to provide additional details on the specific design features (i.e. blowout panels) used to allow the flood water from a CWS system failure to exit the turbine building, including the locations of these design features and the flowpaths of the water after exiting the building to ensure that this water won't adversely affect safety related structures, systems and components. In addition, since the CWS is conceptual design information in the EPR design certification (DC) and was not included in the flood analysis described in Section 3.4 of the EPR DC, the staff requests the COLA applicant to provide a reference to Section 10.4.5 in the appropriate Section of 3.4 of the COLA FSAR regarding the site specific CWS flooding information. Also, provide a FSAR markup to include information from the response to this RAI.

Response

A flood analysis was performed to assess the effect of a flood resulting from a postulated Circulating Water System (CWS) pipe failure inside the Turbine Building and exiting to the yard area.

The CWS consists of two supply and two return 132-inch pipelines that circulate cooling water between the cooling tower and the condenser located inside the Turbine Building. The supply and return CWS pipes are buried between the cooling tower and the Turbine Building. The system is designed to have two vertical CWS pumps feeding into a single supply pipe. Downstream of the cooling tower intake, there is a cross-tie that connects the two CWS supply pipes. During normal four-pump operation, the cross-tie is closed. However, in the event that one of the four vertical CWS pumps is out of service, the plant will operate using the remaining three CWS pumps with the cross-tie opened to balance the supply flow to the condenser.

The design flow for each CWS supply pump is approximately 200,000 gpm and the expected maximum pump run-out flow is 250,000 gpm. The flooding analysis conservatively assumes the rupture of one CWS pipe inside the Turbine Building with the three CWS pumps operating at runout condition, thus delivering the maximum potential flood flow of 750,000 gpm. Because the water available in the cooling tower basin and CWS piping is finite, the maximum flow through the rupture will be sustained for a limited duration and the CWS pumps will eventually shut down.

The Turbine Building has an approximate length of 380 ft and an approximate width of 180 ft, with the ground floor elevation at Elevation 86.0 ft NGVD29. Relief siding will be installed on the north wall (starting from the western corner and excluding the stair tower), and on the entire west wall of the Turbine Building.

As shown in FSAR Figure 2.5-173 (submitted to the NRC on October 9, 2009[1]), the yard area north of the Turbine Building is surrounded by three roads: on the west, north, and east sides. The general grading near the Turbine Building is arranged in a way that flood water exiting the relief siding on the northern side of the Turbine Building will flow primarily in a northerly direction. To direct the flood flow away from the safety SSCs, and to avoid flood water from flowing toward the east where the Reactor Building is located, the finish grade between the north wall of the Turbine Building and the southwest corner of the Essential Service Water (ESW) cooling tower is raised locally in the form of a berm, in addition to other minor local grading in the yard area. The flood flow exiting the west side of the Turbine Building will be naturally diverted in two directions, to the north and the south by the enclosure walls of the transformers located west of the Turbine Building. These flow paths are farther away from the safety SSCs and have less flooding impact. For added conservatism, the flood analysis assumes that all flood flow will exit on the north side of the Turbine Building.

As the flood water flows northward from the Turbine Building, it will be confined by the two ESW Buildings, the east road and the berm along the east side. On the west side, the flow will follow the topography between the west road and the transformers area.

Assuming a steady-state flow of the maximum 750,000 gpm flood water out of the Turbine Building in a uniform hydraulic condition toward the north in the yard and over the north road, the result of the analysis indicates that the flood water will not impact any safety-related SSCs. The safety-related SSCs in the Nuclear Island are protected by the berm between the Turbine Building and the ESW cooling tower. The two safety-related ESW cooling towers on the north side of the Turbine Building are not affected by flood flow because their entrance opening is 14.0 ft above finish grade. Therefore, the flood water from a postulated break of a CWS pipe in the Turbine Building, conservatively evaluated as exiting towards the yard area on the north side of the building, will not create a flood hazard to safety-related SSCs.

---

[1] G. Gibson (UniStar Nuclear Energy) to Document Control Desk (NRC), Letter UN#09-427, Update to Calvert Cliffs Nuclear Power Plant, Unit 3 FSAR Sections 2.5.4 and 2.5.5, dated October 9, 2009.

COLA Impact

FSAR Section 3.4.3.12 is being added as follows:

3.4.3.11 Permanent Dewatering System

The U.S. EPR FSAR includes the following COL Item in Section 3.4.3.11:

> A COL applicant that references the U.S. EPR design certification will define the need for a site-specific permanent dewatering system.

This COL Item is addressed as follows:

{As described in Section 2.4.12.5, based on ground water modelling of post-construction water table elevations, a permanent ground water dewatering system is not anticipated to be a design feature for the CCNPP Unit 3 facility.}

3.4.3.12 Turbine Building Flooding Analysis

Potential flooding of the yard area north of the Turbine Building due to CWS pipe failure inside the building is addressed in Section 10.4.5.3.}

FSAR Section 10.4.5.3 is being revised as follows:

10.4.5.3 Safety Evaluation

The U.S. EPR FSAR includes the following COL Item and conceptual design information in Section 10.4.5.3:

> A COL applicant that references the U.S. EPR design certification will provide information to address the potential for flooding of safety-related equipment due to failure of the site-specific CWS.
>
> [[Means are provided to prevent or detect and control flooding of safety-related areas so that the intended safety function of a system or component will not be diminished due to leakage from the CWS.]]
>
> [[Malfunction or failure of a component or piping in the CWS, including an expansion joint, will not produce unacceptable adverse effects on the functional performance capabilities of safety-related systems or components.]]

The above COL Item is addressed and the conceptual design information is replaced with site-specific information as follows:

{Internal flooding of the Turbine Building due to an un-isolatable break or crack in a circulating water system pipe or failure of a CWS component, including expansion joints, does not result in damage to safety-related SSCs. Below the main steam piping penetrations, no direct pathway through which flooding could spread exists between the Turbine Building and adjacent structures that house safety-related SSCs. No safety-related SSCs reside in the Turbine Building. ~~Flooding exiting the Turbine Building at grade is directed away from structures that house safety-related SSCs by site grading, so external flooding resulting from a failure in the CWS does not adversely affect safety-related SSCs.~~

Flood waters, resulting from a CWS pipe failure inside the Turbine Building, would exit through relief siding installed in the building. Relief siding is installed on approximately 160 ft of the north wall (starting from the western corner and excluding the stair tower), and on the entire west wall of 180 feet to allow flood water to exit the Turbine Building in the event of a rupture in the CWS piping.

As shown in Figure 2.5-173, the yard area north of the Turbine Building is surrounded by three roads: on the west, north, and east sides. The general grading near the Turbine Building is arranged in a way that flood water exiting the relief siding on the northern side of the building will flow primarily in a northerly direction. To direct the flood flow away from the safety SSCs, and to avoid flood water from flowing toward the east where the reactor building is located, the finish grade between the north wall of the Turbine Building and the southwest corner of the Essential Service Water (ESW) cooling tower is raised locally in the form of a berm, in addition to other minor local grading in the yard area. The flood flow exiting the west side of the Turbine Building will be naturally diverted in two directions, to the north and the south by the enclosure walls of the transformers located west of the Turbine Building. These flow paths are farther away from the safety SSCs and have less flooding impact. For added conservatism, the flood analysis assumes that all flood flow will exit through the north side of the Turbine Building.

As the flood water flows northward from the Turbine Building, it will be confined by the two ESW buildings, the east road and the berm along the east side. On the west side, the flow will follow the topography between the west road and the transformers area.

The flood analysis indicates that the postulated CWS piping rupture in the Turbine Building will not impact any safety-related SSCs. The safety-related SSCs in the Nuclear Island are protected by the berm between the Turbine Building and the ESW cooling tower. The two safety-related ESW cooling towers on the north side of the Turbine Building are not affected by flood flow because their entrance opening is 14.0 ft above finish grade. Therefore, the flood water from a postulated break of a CWS pipe in the Turbine Building, conservatively evaluated as exiting toward the yard area on the north side of the building, will not create a flood hazard to safety-related SSCs.

Considering the cooling tower yard topography and cooling tower basin elevation (see ~~FSAR~~ Figures 2.4-7 and 2.5-129), a collapse in a cooling tower basin wall would result in flood water flowing toward the cooling tower area western boundary to design drainage ditches and away from the power block area; consequently, there is no impact to safety-related SSCs in the power block area due to a postulated collapse of a cooling tower basin wall.

Flooding resulting from a postulated CWS pipe failure in the yard area adjacent to the Switchgear Building will not result in a flood hazard to safety-related SSCs. The finish grad topography along the CWS pipe route is designed such that surface runoff is directed to the south away from the power block and toward drainage ditches (~~FSAR~~ Figures 2.4-9 and 2.5-129). To assess the effect of a flood resulting from a postulated CWS pipe failure in the yard area next to the non-safety related Switchgear Building (the closest CW pipe point to the power block area), a flood analysis was performed to determine the flood level. From the results of this analysis, the calculated maximum localized flood level at the non-safety related Switchgear Building (flood origination location) is Elevation 84.1 feet NGVD29. The flood water both spreads and deceases in level as it flows downward and toward the southern drainage path. The respective flood level over the southern perimeter road is at Elevation 83.1 ft NGVD29 and the direction of the flow is away from the power block area. Safety-related structures are located a few hundred feet away from this area and are protected by the high crown of the east side perimeter road and by having a design floor elevation of 84.6 feet NGVD29, which is above the maximum calculated flood elevation. Consequently, the flood water from a postulated break of a CWS pipe in the yard area will not reach the power block area and will not create a flood hazard to safety-related SSCs.}