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

July 2, 2009

UN#09-302

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. 101, Groundwater, Questions 02.04.12-2 and 02.04.12-7

Reference:
1) John Rycyna (NRC) to Robert Poche (UniStar Nuclear Energy), "RAI No 101 RHEB 2092.doc (PUBLIC)" email dated April 20, 2009

2) UniStar Nuclear Energy Letter UN#09-290, from Greg Gibson to Document Control Desk, U.S. NRC, Updated Response Schedule to Request for Additional Information for RAI No. 99, Probable Maximum Tsunami Flooding; RAI No.101, Groundwater; RAI No. 103, Probable Maximum Surge and Seiche Flooding, dated June 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 20, 2009 (Reference 1). This RAI addresses Groundwater, as discussed in Section 2.4.12 of the Final Safety Analysis Report (FSAR), as submitted in Part 2 of the Combined License Application (COLA), Revision 4.

Reference 1 requested UniStar Nuclear Energy to respond to the RAI within 30 days. Reference 2 stated that responses to Questions 02.04.12-2 and 02.04.12-7 would be provided by July 13, 2009.

The enclosure provides our responses to RAI No. 101, Questions 02.04.12-2 and 02.04.12-7 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
NRO

Our responses to RAI No. 101, Questions 02.04.12-2 and 02.04.12-7 do not include any new regulatory commitments.

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 July 2, 2009

Greg Gibson

Enclosure: Response for Request for Additional Information RAI No. 101, Groundwater, Questions 02.04.12-2 and 02.04.12-7, 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/kat

Enclosure

Response for Request for Additional Information
RAI No. 101, Groundwater, Questions 02.04.12-2 and 02.04.12-7,
Calvert Cliffs Nuclear Power Plant Unit 3

RAI No. 101

Question 02.04.12-2

FSAR Section 2.5.4 refers to the hydrogeologic units at the site as Terrace Sand, Chesapeake Clay/Silt (IIa and IIc), and Chesapeake Cemented Sand (IIb). Different titles for the units are used in FSAR Section 2.4.12. Resolve discrepancies between FSAR Sections 2.4.12 and 2.5.4 in the descriptions of the hydrogeologic units at the CCNPP site and in the elevations of the unit contacts. This resolution should include any applicable changes to the FSAR 2.4.13 transport analysis.

Response

Section 2.4.12 of the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 FSAR describes the stratigraphic units at the site based upon their hydrogeologic characteristics, whereas Section 2.5.4 of the FSAR describes the units based upon their geotechnical properties. As a result, the two sections differ in their description of distinct units that can be mapped in the subsurface and their corresponding layer depths and thicknesses. A stratigraphic column correlating the hydrogeologic and geotechnical units is provided in Figure 1.

The unit thicknesses are interpreted from logs of soil borings drilled in the vicinity of the CCNPP Unit 3 site. The logs describe soil samples collected from the soil borings. The soil samples were generally 18 inches long and were not collected continuously, but approximately at 5-foot intervals. Interpolation between samples varies between different investigators and accounts for minor differences in the interpretation of layer thicknesses.

The thicknesses of some of the hydrogeologic units shown in Figure 1 are revised from what were previously described in the FSAR due to a reevaluation of the data. Accordingly, the related transport analysis described in Section 2.4.13 of the FSAR will be revised. RAI 101, Question 2.4.12-11 requested a description of the new numerical modeling effort (referred to in responses to RAI 101, Questions 2.4.12-9 and 2.4.12-10) evaluating post-construction effects to the Upper Chesapeake unit and alternative transport pathways. This new model incorporates revised hydrogeologic unit thicknesses to provide the most current evaluation of alternative transport pathways. Model simulation results and a discussion of transport pathways will be provided in September 2009.

COLA Impact:

FSAR Section 2.4.12.1.3.1 will be supplemented as follows in a future COLA revision:

2.4.12.1.3.1 Geohydrology

The elevations, thicknesses, and geologic descriptions of the sediments comprising the shallow hydrogeologic units (depths to 400 ft (122 m) below ground surface) were determined from CCNPP Unit 3 geotechnical and hydrogeological borings. Geotechnical and geological descriptions of the material encountered are described in Section 2.5.

The unit thicknesses are interpreted from logs of soil borings drilled in the vicinity of the CCNPP Unit 3 site. The logs describe soil samples collected from the soil borings. The soil samples were generally 18 inches long and were not collected continuously, but approximately at 5-foot intervals. Interpolation between samples varies between different investigators and accounts for minor differences in the interpretation of layer thicknesses between Subsection 2.4.12 and Subsection 2.5.4.

Surficial Aquifer

The elevations, thicknesses, and geologic descriptions of the sediments comprising the Surficial aquifer, as determined from the CCNPP Unit 3 geotechnical and hydrogeological borings, are summarized as follows.

FSAR Section 2.4.12.1.3.1 will be revised as follows in a future COLA revision:

2.4.12.1.3.1 Geohydrology

Chesapeake Confining Unit

- The Upper Chesapeake unit is separated from the overlying Surficial aquifer by the informally named relatively thin Upper Chesapeake aquitard. The Upper Chesapeake aquitard ranges in thickness from approximately 4 to 36 ft (1.2 to 11 m) and averages approximately 20 ft (6.1 m). The Upper and Lower Chesapeake units are separated by the informally named Middle Chesapeake aquitard. The thickness of the Middle Chesapeake aquitard ranges from approximately 4 to 22 ft (1.2 to 6.7 m). The Lower Chesapeake unit is separated from the underlying Piney Point - Nanjemoy aquifer by the informally named and relatively thick Lower Chesapeake aquitard. Two CCNPP Unit 3 soil borings penetrated the Lower Chesapeake aquitard, which is approximately 190 ft (57.9 m) thick.

Figure 1 - Stratigraphic Column Correlating Hydrogeologic and Geotechnical Units

AVERAGE THICKNESS (ft)	AVERAGE BOTTOM ELEVATION (ft msl)	HYDROGEOLOGIC UNIT	GEOTECHNICAL UNIT	AVERAGE BOTTOM ELEVATION (ft msl)	AVERAGE THICKNESS (ft)
29	61	Surficial Aquifer	Terrace Sand (Stratum I)	61	28
20	41	Upper Chesapeake Aquitard	Clay/Silt (Stratum IIA)	42	20
45	-5	Upper Chesapeake Unit	Cemented Sand (Stratum IIB)	-18	60
11	-16	Middle Chesapeake Aquitard			
35	-51	Lower Chesapeake Unit	Clay/Silt (Stratum IIC)	-209	190
170	-210	Lower Chesapeake Aquitard			

Question 02.04.12-7

In FSAR Section 2.4.12.4, provide specific details of the anticipated groundwater monitoring programs during CCNPP Unit 3 construction and operation, including monitoring objectives, monitoring locations, what quantities will be measured, and the frequency of monitoring.

Response

The observation well network in the vicinity of Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 currently consists of 40 wells constructed in the summer of 2006. Groundwater levels in the observation well network were monitored monthly from July 2006 through October 2008 and have been monitored quarterly thereafter. Quarterly groundwater level monitoring will continue until the onset of CCNPP Unit 3 construction, at which time most of the existing observation wells will be properly sealed and abandoned in accordance with Maryland Department of the Environment (MDE) Regulation 26.04.04.11. Most of the wells are within the CCNPP Unit 3 power block area and adjacent areas that will be re-graded during construction. For this reason, all but nine of the existing wells will be properly abandoned to allow for construction and eliminate the potential for the wells to become damaged during construction and potentially provide a pathway for contaminants to enter the local groundwater system.

Groundwater levels will continue to be monitored quarterly during the construction of CCNPP Unit 3 in the nine observation wells outside of the construction footprint. The wells that will remain are: OW-768A, -769, -703A, 703B, -718, -725, -743, -759A and -759B. The objective of continued monitoring of water levels is to determine the long-term range of seasonal water-level fluctuation. The range of fluctuation during the construction period will be compared to that identified during monitoring before construction, to determine if groundwater gradients, flow directions and flow velocities are affected by construction activities.

As soon as practical after construction is complete, and before CCNPP Unit 3 begins operation, approximately 29 new observation wells will be installed in the vicinity. The locations of the proposed observation wells are shown on new FSAR Figure 2.4-108. These 29 wells, together with the 9 existing wells, are comparable to the number of wells in the original observation network and provide sufficient coverage to monitor groundwater levels in the three aquifers of primary interest beneath the site of CCNPP Unit 3. These are (in increasing depth) the Surficial aquifer, the Upper Chesapeake unit and the Lower Chesapeake unit. Other deeper regional aquifers exist beneath the CCNPP Unit 3 site, but the shallowest of these (the Piney Point-Nanjemoy aquifer) is separated from the overlying Lower Chesapeake unit by an aquitard approximately 170 ft thick, and it is unlikely that there is a significant flow path from the Lower Chesapeake unit to the deeper aquifers.

The proposed new wells are arrayed in 13 pairs and one well triplet. Eleven of these new well pairs, plus one well pair from the original nine wells, will monitor the vertical hydraulic gradient between the Surficial aquifer and the underlying Upper Chesapeake unit. Two of the new well pairs, plus one well pair from the original nine wells, will monitor the vertical gradient between the Upper Chesapeake unit and the underlying Lower Chesapeake unit. The well triplet will monitor the vertical hydraulic gradient between all three aquifers. Two of the original nine wells are single wells monitoring the Surficial aquifer and three of the original nine wells are single wells monitoring the Upper Chesapeake unit.

Groundwater levels in each of the 38 observation wells (9 existing and 29 new) in the post-construction network will be measured quarterly. After a few years of operational data are evaluated the frequency of monitoring may be revised. The data will be used to construct water table contour maps for the Surficial aquifer and potentiometric surface contour maps for both the Upper and Lower Chesapeake units. These maps will allow determination of groundwater flow gradients, flow directions and flow velocities after operation of Unit 3 begins. In addition, some of these wells may be used during plant operation to monitor groundwater quality, including identifying the presence of plant-related chemicals and/or radionuclides in the vicinity of CCNPP Unit 3. A discussion of the operational groundwater monitoring program, which has been prepared to meet the intent of the Nuclear Energy Institute Groundwater Protection Initiative (NEI 07-07), is provided in the Radiological Environmental Monitoring Program (REMP) for CCNPP Unit 3.

COLA Impact

FSAR Section 2.4.12.4 will be revised as follows in a future COLA revision:

2.4.12.4 Monitoring or Safeguard Requirements

~~Ground water monitoring (water level observation) of the CCNPP Unit 3 area is currently being implemented through the use of the ground water observation wells installed in 2006 for the CCNPP Unit 3 site subsurface investigation and through the periodic review of water levels from selected wells within the Calvert County Ground-Water Level Monitoring Network. Some of the existing CCNPP Unit 3 area observation wells will be taken out of service prior to construction activities due to anticipated earth moving and construction requirements. Prior to construction activities, the observation well monitoring network will be evaluated in order to determine ground water data gaps and needs created by the abandonment of existing wells. These data needs will be met by the installation of additional observation wells, if required. Additionally, the hydrologic properties and ground water flow regimes of the shallow water bearing units (Surficial aquifer, and to a lesser extent, the Chesapeake units) will be impacted by the proposed earthmoving, regrading, and construction of infrastructure (buildings, parking lots, etc.). Revisions to the observation well network will be implemented to ensure that the resulting changes in the local ground water regime from construction activities will be identified.~~

The observation well network in the vicinity of CCNPP Unit 3 currently consists of 40 wells constructed in the summer of 2006. Groundwater levels in the observation well network were monitored monthly from July 2006 through October 2008 and have been monitored quarterly thereafter. Quarterly groundwater level monitoring will continue until the onset of CCNPP Unit 3 construction, at which time most of the existing observation wells will be properly sealed and abandoned in accordance with MDE Regulation 26.04.04.11. Most of the wells are within the CCNPP Unit 3 power block area and adjacent areas that will be re-graded during construction. For this reason, all but nine of the existing wells will be properly abandoned to allow for construction and to eliminate the potential for the wells to become damaged during construction and potentially provide a pathway for contaminants to enter the local groundwater system.

Groundwater levels will continue to be monitored quarterly during the construction of CCNPP Unit 3 in the nine observation wells outside of the construction footprint. The following wells will remain: OW-768A, -769, -703A, 703B, -718, -725, -743, -759A and -759B. The objective of continued monitoring of water levels is to determine the long-term range of seasonal water-level

fluctuation. The range of fluctuation during the construction period will be compared to that identified during monitoring before construction, to determine if groundwater gradients, flow directions and flow velocities are significantly affected by construction activities.

As soon as practical after construction is complete, and before CCNPP Unit 3 begins operation, approximately 29 new observation wells will be installed in the vicinity of CCNPP Unit 3. The locations of the proposed observation wells are shown on FSAR Figure 2.4-108. These 29 wells, together with the 9 existing wells, are comparable to the number of wells in the original observation network and provide sufficient coverage to monitor groundwater levels in the three aquifers of primary interest beneath the site of CCNPP Unit 3. These are (in increasing depth) the Surficial aquifer, the Upper Chesapeake unit and the Lower Chesapeake unit. Other deeper regional aquifers exist beneath the CCNPP Unit 3 site, but the shallowest of these (the Piney Point-Nanjemoy aquifer) is separated from the overlying Lower Chesapeake unit by an aquitard approximately 170 ft thick and it is unlikely that there is a significant flow path from the Lower Chesapeake unit to the deeper aquifers.

The proposed new wells are arrayed in 13 pairs and one well triplet. Eleven of these new well pairs, plus one well pair from the original nine wells, will monitor the vertical hydraulic gradient between the Surficial aquifer and the underlying Upper Chesapeake unit. Two of the new well pairs, plus one well pair from the original nine wells, will monitor the vertical gradient between the Upper Chesapeake unit and the underlying Lower Chesapeake unit. The well triplet will monitor the vertical hydraulic gradient between all three aquifers. Two of the original nine wells are single wells monitoring the Surficial aquifer and three of the original nine wells are single wells monitoring the Upper Chesapeake unit.

Groundwater levels in each of the 38 observation wells (9 existing and 29 new) in the post-construction network will be measured quarterly. The data will be used to construct water table contour maps for the Surficial aquifer and potentiometric surface contour maps for both the Upper and Lower Chesapeake units. These maps will allow determination of groundwater flow gradients, flow directions and flow velocities after operation of CCNPP Unit 3 begins. In addition, some of these wells may be used during plant operation to monitor groundwater quality, including identifying the presence of plant-related radionuclides in the vicinity of CCNPP Unit 3.

FSAR Section 2.4 will be revised to add the following as Figure 2.4-108 in a future COLA revision:

Figure 2.4-108 {Proposed Post Construction Observation Well Locations}