September 1, 2011

APPLICANT: UniStar Nuclear Operating Services, LLC.

PROJECT: Calvert Cliffs Nuclear Power Plant, Unit 3 Combined Operating License Application

SUBJECT: SUMMARY OF JUNE 23, 2011, PUBLIC MEETING WITH UNISTAR NUCLEAR OPERATING SERVICES, INC. TO DISCUSS TOPICS RELATED TO CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT 3 FINAL SAFETY ANALYSIS REPORT SECTION 3.7, SECTION 3.8, AND SECTION 14.3.2

On June 23, 2011, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) staff and representatives of UniStar Nuclear Operating Services, Inc., at the Excel Services Corporation office in Rockville, Maryland. The purpose of the meeting was to discuss with UniStar seismic and structural design topics related to the application for the Calvert Cliffs Nuclear Power Plant (CCNPP), Unit 3, Combined License. The meeting notice can be accessed through the Agencywide Documents Access and Management System (ADAMS) Accession No. ML111711530. This system provides text and image files of NRC public documents. A list of attendees is provided as an enclosure.

After the opening remarks and the introduction of the attendees, the meeting ground rules and logistics were announced. The NRC staff then briefly reviewed the meeting agenda. UniStar made some opening remarks regarding its expectations for the meeting and regarding the technical discussion of the issues, schedule impacts, and identification of the next steps in the review process (ADAMS accession number ML111810126). The NRC staff then began the technical discussion of each of the issues, as listed in the agenda, identified in its review of CCNPP, Unit 3 Final Safety Analysis Report (FSAR) Section 3.7, “Seismic Design,” and the associated March 31, 2011, Request for Additional Information (RAI) responses from UniStar, as follows:

1. Nuclear Island (NI) site-specific analysis (Reference RAI 252, Question 03.07.01-15):

    a. The NRC staff stated that the current NI site-specific analysis is based on a surface mounted stick model with a rigid base, and UniStar has concluded that the current site-specific confirmatory analysis is sufficient to demonstrate that the U.S. EPR structural design may be used at the CCNPP, Unit 3 site without alteration. The U.S. EPR analysis however, has been revised, and is now based on an embedded finite element (FE) model with an elastic mat. The NRC staff believes that there needs to be reconciliation between the AREVA analysis results used as the basis for the certified design and the CCNPP, Unit 3 analysis results. In addition, the NRC staff needs to know how the CCNPP, Unit 3 NI stability analysis was performed since the stability analysis for the U.S. EPR uses a fully

embedded FE model and includes the effect of the lateral soil pressure in the stability evaluation.

b. The NRC staff stated that the CCNPP, Unit 3 analysis does not directly address the fact that engineered backfill will be used under the structure. The original analysis is based on the mat sitting directly on top of Chesapeake Cemented Sand. The strain dependent lower bound properties of the Chesapeake Cemented Sand were shown to be bounded by the lowest assumed soil properties for the U.S. EPR, which UniStar states for CCNPP, Unit 3 is a velocity of 700 ft/sec. However, the latest draft version of the U.S. EPR FSAR has the minimum shear wave velocity used in the analysis of the NI as 820 ft/sec. With the addition of structural backfill beneath the mat, the CCNPP, Unit 3 strain dependent shear wave velocities are below 700 ft/sec. This is a departure from the U.S. EPR analysis. UniStar has provided some indirect justification for this departure which requires further clarification.

After discussion of both of these issues, UniStar agreed that a reconciliation of the analyses noted above will be performed to demonstrate that the USEPR NI structural design may be used at the CCNPP, Unit 3 site without alteration. The NRC staff stated that it will consider generating a follow-up RAI regarding these issues.

2. Seismic analysis of Emergency Power Generating Buildings (EPGB) and Essential Service Water Building (ESWB):

The NRC staff stated that AREVA has revised the design of the ESWB and EPGB to address stability issues. The revised design should be addressed in the CCNPP, Unit 3 site-specific analysis of these structures. After a discussion of this issue with UniStar, the NRC staff stated that it will consider generating a follow-up RAI regarding the issue.

3. Stability analysis of Nuclear Auxiliary Building (NAB) (Reference RAI 65, Question 03.07.02-18):

The NRC staff stated that AREVA is still performing the stability evaluation of the U.S. EPR NAB. Stability of the NAB for CCNPP, Unit 3 cannot be confirmed until the U.S. EPR stability evaluation is complete or UniStar performs a site-specific analysis for CCNPP, Unit 3. After a discussion of this issue with UniStar, the NRC staff stated that it will consider generating a follow-up RAI regarding the issue.

4. Seismic II/I evaluation of Access Building (AB) and Turbine Building (TB) (Reference Follow-up to RAI 253, Question 03.07.02-46):

The NRC staff stated that UniStar has not provided information about the analysis and design of the AB and the TB for CCNPP, Unit 3 to address II/I interaction of these buildings with adjacent Seismic Category I buildings, other than stating that they will be designed to Seismic Category I requirements. The

NRC staff needs more detailed information about seismic input, Seismic analysis, and design of these buildings in order to conclude that they will not have any adverse interaction with the adjacent Seismic Category I buildings. As part of demonstrating that there is no adverse interaction, UniStar will also need to provide the results of a stability analysis for each of these structures. After a discussion of this issue with UniStar, the NRC staff stated that it will consider generating a follow-up RAI regarding the issue.

5. Stability Analysis of EPGB and ESWB (Reference Follow-up to RAI 253, Question 03.07.02-49):

   The NRC staff indicated that in the response to RAI 253, Question 03.07.02-49, the revised FSAR Section 3.7.2.14.2 describing the stability analysis of the EPGB and ESWB states that the responses include the effects of seismic forces and dynamic lateral earth pressures. However, in the response UniStar states that the Soil Structure Interaction (SSI) calculation considered demand and capacity from the basemat only and the effects from the side wall and side soil were neglected in the stability evaluation. Because of the potential conflicting information, the NRC staff would like a description of the stability analysis of these two structures including the coefficients of friction used in the calculation; whether or not adhesion was considered; and a comparison of the maximum dynamic bearing pressures computed from the analysis versus the allowable bearing stresses and the basis for the allowable bearing stresses. After a discussion of this issue with UniStar, the NRC staff stated that it will consider generating a follow-up RAI regarding the issue.

6. Lateral Soil Pressures of the ESWB (Reference Follow-up to RAI 253, Question 03.07.02-49):

   The NRC staff stated that regarding the portion of the response to RAI 253, Question 03.07.02-9 addressing the ESWB, the NRC staff needs additional information regarding the analysis performed to demonstrate there is no separation of the lateral soil during the SSI analysis of the ESWB. This includes:

   - A profile of the lateral soil pressure and how it was determined.
   - The reason for the difference in static soil pressures as shown by the solid red lines and dotted red lines in Figures 12 through 29.
   - The basis for using a wider tributary wall to eliminate the exceedances of the solid red line.

   After a discussion of this issue with UniStar, the NRC staff stated that it will consider generating a follow-up RAI regarding the issue.

7. Stability Analysis of the Common Basemat Intake Structure (CBIS) (Reference Follow-up to RAI 253, Question 03.07.02-49:

   The NRC staff stated that regarding the portion of the response to RAI 253, Question 03.07.02-49 addressing the CBIS stability analysis, it states that the static and dynamic earth pressures along the embedment depth were not

considered in the sliding and overturning factor of safety, and the seismic stability evaluation was performed using only the dynamic and static stresses at the interface between the foundation mat and the soil. However, based on Note 1 in FSAR Table 3.8-2 providing the stability results for the CBIS, it appears that friction between the side walls and backfill is used in the stability load combinations which include earthquake. FSAR, Table 3.8-1 provides a static coefficient of friction of 0.52 between the CBIS sidewall and structural fill. Since it is not clear how the sliding factor of safety was determined the NRC staff needs the following additional information:

- Provide the details of how the capacity to resist sliding is determined.
- Describe how the effects of the vertical earthquake and buoyancy effects were considered in the sliding evaluation.
- Identify the coefficients of friction used in the sliding calculations and provide its basis.
- Was adhesion used and, if so, how was it applied in the stability calculations?
- If adhesion was used provide a description of how the value of adhesion was determined and why its use is justified in the stability calculations.
- Clarify if lateral soils resistance was included in the CBIS stability calculations and, if so, how this resistance was determined.
- Confirm if the at rest lateral soil pressure is uniform about the structure. If it is not uniform, it will result in a net positive load that should be considered in the stability demand of the structure.

After a discussion of these issues with UniStar, the NRC staff stated that it will consider generating a follow-up RAI regarding the issues.

8. Mesh Size for the CBIS SSI Analysis:

The NRC staff stated that UniStar was recently sent follow-up RAI 304, Question 03.07.02-54 regarding the mesh size used in the SSI analysis of the CBIS. In that question, the NRC staff had asked for the following additional information:

- Provide for the horizontal directions the soil model mesh size for elevations both above and below elevation -27.5 ft and their technical basis.
- Provide the basis for the mesh size in the vertical direction below elevation -27.5 ft.
- Demonstrate that the dynamic structural model is sufficiently detailed such that further refinement will have a negligible effect on the solution results.

These information needs were discussed with UniStar for the preparation of their response due on July 12, 2011.

9. Soil Column Models used in the SSI analysis of Seismic Category I Structures (Reference Follow-up to RAI 252, Question 03.07.01-15):

   In response to RAI 252, Question 03.07.01-15, UniStar provided the results of a 1-D versus 2-D site response analysis to demonstrate that the extent of backfill used did not affect the analysis results. UniStar should address whether the stiffer backfill as compared with the in-situ sand will have an effect on the frequency response of the soil-structure model used in the SSI analysis. These information needs were discussed with UniStar.

   After discussion of this issue, the NRC staff stated that it will consider generating a follow-up RAI regarding this issue.

10. Concerns With Respect to Use of Structural Backfill (Reference Follow-up to RAI 252, Question 03.07.01-15):

    The NRC staff stated that there are concerns with respect to the use of the structural backfill that the NRC staff would like addressed. The shear wave velocities are lower than those assumed for the U.S. EPR standard design. While UniStar has shown that the U.S. EPR in-structure response spectra (ISRS) envelope the ISRS developed in the confirmatory analysis for CCNPP, Unit 3, it has not addressed the effect of the relatively soft soil on the design loads for the foundation mats of the U.S. EPR structures. In addition, the dynamic bearing stresses may exceed allowable bearing stresses. Regarding the Inspection, Test, Analysis and Acceptance Criteria (ITAAC) for structural fill provided in Table 2.4-1, it states that shear wave velocity for the EPGB and ESWB at the bottom of the foundation and below will be greater than or equal to 630 ft/sec and 720 ft/sec, respectively. This will be determined from field measurements when the structural placement is at the elevation of the bottom of the foundation and at finished grade. However, these measurements will represent low strain values. The Site Specific Earthquake strain dependent shear wave velocities corresponding to these low strain values will likely be lower than the strain dependent backfill shear wave velocities (620 ft/sec and 680 ft/sec) used in the SSI analysis as reported in revised FSAR Section 2.5.2.6.1. This will affect the site-specific analysis results. After a discussion of these issues with UniStar, the NRC staff stated that it will consider generating a follow-up RAI regarding the issues.

The NRC staff then led a discussion focusing on the review of CCNPP, Unit 3 FSAR, Section 3.8, “Structural Design,” and FSAR 14.3.2 ITAAC. Technical details of some of the recently issued RAIs in both of these areas were clarified. A review of the status and schedule for these responses was conducted. Plans for a potential FSAR Section 3.8 and 14.3.2 audit in November 2011, were discussed. One member of the public was present at the meeting via a teleconference.

Please direct any inquires concerning this meeting to me at 301-415-2304, or Michael.Miernicki@nrc.gov .

/RA/

Michael J. Miernicki, Senior Project Manager
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Office of New Reactors

Docket No. 52-016

Enclosure:
List of Attendees

cc: See next page

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/RA/

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Docket No. 52-016

Enclosure:
List of Attendees

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AGENDA

U.S. NRC Public Meeting with UniStar to Discuss Topics Related to CCNPP3 FSAR Sections 3.7, 3.8, and 14.3.2

Thursday, June 23, 2011
8:30 a.m. - 5:00 p.m.

Excel Services Corporation
11921 Rockville Pike,Suite 100
Rockville, Maryland

TIME	TOPIC	LEAD
8:30 a.m.	Introductory Remarks	NRC/UniStar
8:45 a.m.	Discussion of FSAR 3.7 Seismic Design: - Nuclear Island site-specific analysis - Seismic analyses of EPGB and ESWB - Stability analysis of NAB - Seismic II/I evaluation of AB and TB - Stability analysis of EPGB and ESWB - Lateral soil pressures on the ESWB - Stability analysis of the CBIS - Mesh size for the CBIS SSI analysis - Soil column models used for SSI analysis of Cat I structures - Concerns on use of structural backfill - Other items	NRC/UniStar
11:50 p.m.	Opportunity for public comment*	NRC
12:00 p.m.	Break for lunch	
1:00 p.m.	Continue discussion of Seismic Design	NRC/UniStar
2:00 p.m.	Discussion of FSAR 3.8 Structural Design and FSAR 14.3.2 ITAAC: - Clarification discussion on recently issued RAIs - Summary of RAI response status / approach - FSAR section 3.8 and 14.3.2 audit discussion - Other items	NRC/UniStar

ENCLOSURE 1

4:30 p.m.	Open discussion/ summary of action items	NRC/UniStar
4:50 p.m.	Opportunity for public comment*	NRC
5:00 p.m.	Adjourn	

Note - *All times listed are approximate and for planning purposes only. Adjustments may be made during the meeting as necessary, including additional meeting breaks.*

** The public will be given an opportunity to comment at this point in the meeting*

Meeting with UniStar Nuclear Operating Services, to Discuss Topics Related to CCNPP3 FSAR Sections 3.7, 3.8, and 14.3.2

June 23, 2011

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Samir Chakrabarti	NRC
Surinder Arora	NRC
Kim Hawkins	NRC
David Jeng	NRC
Greg Gibson	UniStar
Rob Poche	UniStar
Wayne Massie	UniStar
Weijun Wang	NRC
Steven Strout	Unistar
Todd Oswald	Areva NP
Stephen Routh	Bechtel
Jacob Kulangara	Bechtel
Vladimir Graijer	NRC
David Foster	Numark
Jaspal Saini	Bechtel
Martin Owens	Areva NP
Thomas Houston	Numark
Carl Costantino	Numark
Sunwoo Park	NRC

ENCLOSURE 2

Name	Organization
Mike Edwards	Rizzo
Tarek Elkhoraibi	Bechtel
Kelli Voelsing	Public
Russ Wells	Areva NP
Mel Gmyrek	Areva NP
Mark Finley	UniStar
John Robberts	UniStar
Chuck Rayburn	UniStar
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