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August 23, 2011

UN#11-240

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Calvert Cliffs Nuclear Power Plant, Unit 3
RAI Closure Plan

- Reference
- (1) Emails from Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy) – Calvert Cliffs Nuclear Power Plant Unit 3 Combined License Application – Final RAI 314 SEB2 5926 and RAI 315 SEB2 5927, dated August 03, 2011
 - (2) Emails from Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy) – Calvert Cliffs Nuclear Power Plant Unit 3 Combined License Application – Draft RAI 316 SEB2 5988 and RAI 317 RSRLB 5839, dated August 11, 2011
 - (3) UniStar Nuclear Energy Public Meeting with NRC dated June 23, 2011

On June 3, 2008, UniStar Nuclear Energy's (UNE) Calvert Cliffs Nuclear Power Plant Unit 3 (CC3), Combined License Application (COLA) was docketed by the NRC, and the NRC began the six phase COLA review process.

In the ensuing thirty-eight months, UNE has received 317 Phase 2 Requests for Additional Information (RAIs) involving 1,060 individual questions. The last of these 317 Phase 2 RAIs was received on August 3, 2011 (Reference 1) and August 11, 2011 (Reference 2). As of this date, UNE has responded to 1013 of the 1,060 Phase 2 RAI questions.

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Of the 47 Phase 2 open RAI questions, 35 RAI questions involve Civil/Structural/Seismic issues associated with FSAR Chapters 2 and 3 (i.e., FSAR Chapters 2.5, 3.7, and 3.8).

Of the 47 Phase 2 open RAI questions, only 12 RAI questions involve the remaining chapters awaiting Phase 3 ACRS review (SER Chapters 1, 7, 9, 13, 14, 15, and 18). UNE expects to provide responses to these 12 remaining Phase 2 RAI questions between now and January 4, 2012. See Table 2 for the remaining RAI response submittal dates.

We would note that UNE has completed ACRS Phase 3 review of 12 FSAR Chapters. The Phase 3 review resulted in 36 SER Open Items. UNE has already responded to 35 of these 36 SER Open Items. Also, UNE has received 13 Phase 4 RAI questions, and we have already responded to seven of those questions.

As evidenced by this performance, UNE is working well with the NRC Staff to receive and answer NRC questions as quickly as resources and circumstances will allow.

This letter presents UNE's Closure Plan for the 35 open Phase 2 RAI Civil/Structural/Seismic issues associated with FSAR Chapters 2 and 3 (i.e., FSAR Chapters 2.5, 3.7, and 3.8).

Closure Plan

One of the 35 open Phase 2 Civil RAI questions (RAI 307) involves a question related to settlement of the structures. UNE provided a partial response on August 3, 2011, and expects to complete the remaining items by September 5, 2011. This will complete Phase 2 RAI questions on settlement.

Before discussing the remaining 34 open Phase 2 RAI questions involving Civil/Structural/Seismic, we would provide two discussion items for background information:

- On August 5, 2011, UNE provided a response to RAI 284 involving the New Madrid Seismic Zone (NMSZ). In that question, NRC Staff requested the calculation of the 1.0 Hz hazard curve accounting for the effects of the NMSZ. UNE performed the calculation and reached the conclusion that the NMSZ impacts the CC3 Probabilistic Seismic Hazards Analysis and Ground Motion Response Spectra (GMRS) and may impact other factors such as the plant's Safe Shutdown Earthquake. Our August 5, 2011, response noted: (1) the NMSZ had not previously been considered; (2) we generated and provided a curve of the NMSZ contribution; and (3) we concluded that the NMSZ low frequency contribution was significant enough that a new GMRS should be developed and incorporated into future work. We are working to provide revised COLA figures and tables, and to provide appropriate outputs from the NMSZ into Soil-Structural Interaction (SSI) models.
- In 2010, the AREVA U.S. EPR™ Design Certification application began to develop In-Structure Response Spectra (ISRS) using an embedded finite element model, as opposed to the original seismic analyses based on a surface founded stick model.

UNE had discussed with the NRC Staff at public meetings in February and March 2011, using a qualitative approach (described in SER Chapter 2.5.2.6) to reconcile the differences in methodology between the Design Certification and the COLA, for the surface founded stick model versus the embedded finite element model. The basis of our engineering judgment was that since the CC3 site is a 0.076g SSE site, and our site

specific safety-related structures will be designed to 0.15g SSE and our generic (DC) structures will be designed to 0.3g SSE – that sufficient GMRS margin exists such that a detailed and comprehensive seismic reconciliation analysis was not warranted.

However, at the Reference (3) meeting, the NRC Staff noted that the CC3 site has other variations from the Design Certification model, namely soft soil/backfill, different soil columns, and a shear wave velocity inversion, which are independent factors separate from the Ground Motion Response Spectra (GMRS) qualitative bounding analysis methodology proposed. These concerns were documented in Reference 1. The unknown cumulative effect of these variations caused the staff to question the ability to currently justify a qualitative reconciliation.

While our engineering judgment remains that qualitative analysis would continue to demonstrate that ample margins exist, we agree with the staff that a quantitative, embedded finite element model seismic reconciliation could be performed for using the site specific CC3 inputs to definitively document and confirm our engineering judgment, and to permit the use of qualitative reconciliation in the future, as appropriate.

For the 34 remaining Phase 2 RAI questions on Civil/Structural/Seismic issues associated with FSAR Chapters 2 and 3 (i.e., FSAR Chapters 2.5, 3.7, and 3.8):

- 1) Confirmatory, quantitative seismic reconciliations using the methodology and models (e.g. embedded finite element) described within the US EPR™ FSAR will be performed for the Nuclear Island (NI) and Essential Service Water Building (ESWB). The Emergency Power Generation Buildings (EPGB) will be analyzed with a surface finite element model.

Importantly, UNE's contractor, AREVA, will be performing these analyses using the methodology and models (with the CC3 Site Specific Inputs including new NMSZ influence, etc.) that have already been reviewed in detail over the past 2 years by the NRC Staff during the US EPR™ Design Certification Chapter 3 review. We point to this fact, as UNE would expect the NRC Staff to be intimately familiar with the AREVA methodologies; and therefore for schedule planning purposes, minimal (if any) additional RAI questions should be expected on our reconciliation submittal and RAI responses.

- 2) RAI responses for the CC3 FSAR Chapters 2.5, 3.7, and 3.8 (including References 1 and 2) will be submitted as presented in the attached summary Table 1. RAI response dates within the Table 1 are prioritized according to UniStar's understanding of the NRC's Phase 2 SER preparation schedules. For example:

- The Nuclear Island and EPGB settlement reconciliations have been given priority due to the importance of the settlement results at CC3, particularly for the Nuclear Island.
- The ESWB seismic and settlement reconciliations are scheduled for the 2nd quarter of 2012 subsequent to analyses being performed within the Design Certification.

The dates presented within the Table 1 for RAIs 253, 284, 301, 304, 308, 310 are complex and further discussion is provided on the following issues:

- Civil/structural/seismic RAIs are highly interdependent and their technical bases are collectively impacted by NRC staff questions. This has and continues to challenge our

scheduled closure dates, as a change in one response typically alters others or affects their technical bases. An example is our discussion above on RAI 284 where the staff asked for an assessment of the New Madrid Seismic Zone (NMSZ) impact.

However, the site SSE is one of the principal inputs to the site-specific seismic design and subsequently to the stability analysis for site-specific structures. As such, it affects many other RAI responses (most recently, the RAIs 314 & 315 just received on August 3rd), and the SSE remains a single point schedule uncertainty until it is finalized.

- The Table 1 dates provided for RAIs 314 and 315 are contingent upon UniStar's understanding of the staff's questions and our finalization of a response strategy. The NRC staff requested modeling results for the Turbine Island, Auxiliary Building, and Service Building during an August 3rd clarifying call.
- The CC3 FSAR Chapter 3.7.2 is based upon a single soil column analysis. UNE is evaluating whether the stability evaluation should be delayed to incorporate more than one backfill depth in the analysis. If multiple soil columns must be developed, the response for RAI 315 Question 3.07.02-62 could be delayed an additional 2 months. UNE's evaluation will be completed in November 2011, and an update to the schedule will be provided if necessary.
- Accordingly, UNE will be requesting further meetings with the NRC Staff in September and November to achieve clarity, alignment, and consensus on the specific calculations to be performed.

Table 2 provides response dates for the remaining 12 non-civil Calvert Cliffs Unit 3 open RAI questions.

Summary

Tables 1 and 2 supersede any previously submitted RAI submittal schedule dates, and should be utilized by the NRC for schedule and resource planning purposes.

UNE appreciates the NRC's thorough and detailed assessment of the COLA application, and for the Staff's comments and insights offered during the public meeting on June 23, 2011. We look forward to having frequent dialogue and interactions with NRC as we progress through closure of these RAIs and our updates/closure of FSAR Chapters 2.5, 3.7, and 3.8.

UNE respectfully requests NRC review and acceptance of our RAI Closure Plan, provided above, based upon our engineering judgment that our reconciliation analyses will confirm that the design remains robust and will meet regulatory requirements. If our Closure Plan is acceptable, we request that the NRC permit any outstanding Phase 2 RAI questions to be classified as SER Open Items, to be closed in Phase 4 at the time of final SER preparation. UniStar understands the risk we are assuming as the applicant, for moving closure of some of these RAIs until Phase 4.

UN#11-240
August 23, 2011

This letter does not contain any proprietary or sensitive 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 23, 2011

A handwritten signature in black ink, appearing to read 'Greg Gibson', with a long horizontal line extending to the right.

Greg Gibson

Attachments: Table 1 – Civil/Structural/Seismic RAIs
 Table 2 – Remaining Calvert Cliffs 3 RAIs

cc: Surinder Arora, NRC Project Manager, U.S. EPR Projects Branch
 Prosanta Chowdhury, NRC Project Manager, U.S. EPR Projects Branch
 Joseph Colaccino, Chief, 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
 Sandra Sloan, AREVA NP Manager, New Plants Regulatory Affairs

Table 1 – Civil/Structural/Seismic RAIs			
Activity	RAI Number	Question	UNE Response Date to NRC
Seismic Analysis	304	3.07.02-55, 3.07.02-58, 3.07.02-59	8/25/2011
Foundations	308	3.08.05-7	8/25/2011
Foundations	310	3.08.04-27	8/26/2011
New Madrid GMRS/Time Histories	284	02.05.02-22	COLA Markup Schedule 8/30/2011
Structural ITAAC	275	14.03.02-13	9/2/2011
Subsurface Materials (Settlement)	307	2.05.04-31	9/5/2011
Seismic Analysis	304	3.07.02-54	9/15/2011
Seismic Design	301	3.08.04-22	9/22/2011
Foundations	310	3.08.04-25, 3.08.04-28	9/26/2011
Shear Wave V for NI, CBIS, Cat II SSE structures to Table 2.4-1	314	3.07.01-17	9/30/2011
Shear Wave ITAAC for fill beneath NI	N/A	N/A	9/30/2011
Foundations	310	3.08.04-26	10/3/2011

Table 1 – Civil/Structural/Seismic RAIs

Activity	RAI Number	Question	UNE Response Date to NRC
Seismic Analysis	304	3.07.02-57	10/6/2011
Seismic Analysis	304	3.07.02-60, 3.07.02-61	10/20/2011
Seismic Design	301	3.08.04-18, 3.08.04-20	10/31/2011
Foundations	310	3.08.04-24	11/11/2011
Seismic Analysis Cat II-SSE	253	3.07.02-45	11/14/2011
Seismic Design	301	3.08.04-23	11/15/2011
NI Settlement/ FSAR Input	308	3.08.05-8	12/15/2011
EPGB Settlement/ FSAR Input	308	3.08.05-9	1/31/2012
Seismic Analysis - SASSI	316	3.07.02-67	1/31/2012
Seismic Analysis	304	3.07.02-56	3/31/2012
Seismic Analysis	253	3.07.02-46 (CWIS)	3/31/2012
CBIS Seismic & Stability	315	3.07.02-64	3/31/2012
ESWB Settlement/ FSAR Input	308	3.08.05-9	4/30/2012
Nuclear Island (NI) site- specific seismic analysis	314	3.07.01-16	4/30/2012
Nuclear Island (NI) Stability	315	3.07.02-64	4/30/2012
EPGB site-specific seismic analysis	314	3.07.01-16	5/15/2012
EPGB Stability	315	3.07.02-64 3.07.02-66	5/15/2012
EWSB site-specific seismic analysis	314	3.07.01-16	6/15/2012

Table 1 – Civil/Structural/Seismic RAIs			
Activity	RAI Number	Question	UNE Response Date to NRC
ESWB Stability	315	3.07.02-64 3.07.02-65 3.07.02-66	6/15/2012
Seismic Design	301	3.08.04-21	6/15/2012
NAB Stability and Interaction	315	3.07.02-62	6/15/2012
TB/SB Stability & Interaction	315	3.07.02-63	6/18/2012
AB Stability & Interaction	315	3.07.02-63	6/30/2012

Note: RAIs 314 and 315 have multiple response dates for individual questions depending on which building is being evaluated. UNE will submit responses, as indicated above, as the evaluations are completed.

Table 2 – Remaining Calvert Cliffs 3 RAIs

Activity	RAI Number	Question	UNE Response Date to NRC
Probabilistic Risk Assessment	313	19-26	9/15/2011
ITAAC Waterproofing	309	14.3.02-18	9/15/2011
Environmental Qualification	302	3.11-7, 3.11-8, 3.11-9, 3.11-10	9/23/2011
Technical Specs	305	16-23	9/23/2011
Ultimate Heat Sink	279	9.02.05-9	9/30/2011
Reliability Assurance Program	306	17.04-11	11/11/2011
Ultimate Heat Sink	279	9.02.05-12	11/21/2011
Physical Security ITAAC	317	14.03.12-8	12/1/2011
Ultimate Heat Sink	287	9.02.05-19	1/4/2012