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UniStar
NUCLEAR ENERGY

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January 14, 2010

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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. 109, Question 03.02.01-5, Seismic Classification

References:
1) John Rycyna (NRC) to Robert Poche (UniStar Nuclear Energy), "RAI No 109 EMB2 2238.doc (PUBLIC)" email dated April 27, 2009

2) UniStar Nuclear Energy Letter UN#09-512, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 109, Question 03.02.01-5, Seismic Classification, dated December 7, 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 27, 2009 (Reference 1). This RAI addresses Seismic Classification, as discussed in Section 3.2 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 6.

Reference 2 provided a response date for Question 03.02.01-5 of January 15, 2010. The enclosure provides our response to RAI No. 109, Question 03.02.01-5, and includes revised COLA content.

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A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA. Our response to Question 03.02.01-5 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. Michael J. Yox at (410) 470-6317.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 14, 2010

Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI No. 109, Question 03.02.01-5, Seismic Classification, 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)
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U.S. NRC Region I Office

GTG/RDS/mdf

Enclosure

Response to NRC Request for Additional Information
RAI No. 109, Question 03.02.01-5, Seismic Classification
Calvert Cliffs Nuclear Power Plant, Unit 3

RAI No. 109

Question 03.02.01-5

Position C.2 of Regulatory Guide 1.29 states that those portions of SSCs of which continued function is not required but of which failure could reduce the functioning of any safety-related SSCs to an unacceptable safety level should be designed and constructed so that the SSE would not cause such failure. As indicated in Table 3.2-1 in the CCNPP3 FSAR, the turbine building is classified as conventional seismic (CS) and designed to the International Building Code seismic criteria. State the basis for the CS category. Is the separation distance between the turbine building and safety-related SSCs adequate to preclude the collapse of the turbine building from adversely affecting the function of the safety-related SSCs in a safe shutdown earthquake? Please explain.

Response

The Switchgear Building is a steel framed structure located adjacent to the Turbine Building. The Turbine Building and Switchgear Building together comprise a common Turbine Island (TI) structure. The TI structure's Lateral Force Resisting System (LFRS) provides restraint for seismic and tornado wind loading.

As described in response to RAI 65, Questions 03.07.02-9, 03.07.02-18, and 03.02.07-19, and RAI 180, Question 03.07.02-41[1], the Turbine Building and Switchgear Building are classified as Seismic Category II. As such, the Turbine Building and Switchgear Building will be designed using conventional seismic codes and standards (IBC, ACI 318, AISC 341 and AISC 360), but will also be analyzed and designed using site-specific SSE Spectrum to prevent seismic interaction with the adjacent Seismic Category I SSCs. An evaluation of the site-specific SSE responses will confirm that the separation distance between the TI structure and the Seismic Category I SSCs exceeds the sum of the maximum relative seismic displacement between the structures, construction tolerances and settlement effects by an appropriate factor of safety.

This analysis methodology will confirm preclusion of seismic interaction of the TI with the adjacent Seismic Category I structures, systems, and components.

COLA Impact

FSAR Section 3.7.2.8 will be revised as indicated in the response to RAI 65, Questions 03.07.02-9, 03.07.02-18, and 03.02.07-19, and RAI 180, Question 03.07.02-41[1]. FSAR Section 3.7.2.8, as revised in these responses, is provided below:

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[1] UniStar Nuclear Energy Update to CCNPP Unit 3 FSAR Section 3.7 and Response to FSAR Section 3.7 RAI Sets 19, 25, 58, 63, 65, 112, 113, 139, 158, 159, 167, 168, 179, 180, 181, and 193, Letter UN#09-519, dated 12/29/09.

3.7.2 SEISMIC SYSTEM ANALYSIS

3.7.2.8 Interaction of Non-Seismic Category I Structures with Seismic Category I Systems

The U.S. EPR FSAR includes the following COL Item and conceptual design information in Section 3.7.2.8:

> A COL applicant that references the U.S. EPR design certification will provide the site-specific separation distances for the Access Building and Turbine Building.
>
> [[The separation gaps between the AB and SBs 3 and 4 are 0.98 ft and 1.31 ft, respectively (see Figure 3B-1).]]
>
> [[The separation between the TB and NI Common Basemat Structures is approximately 30 ft (see Figure 3B-1).]]

The COL Item and the conceptual design information are addressed as follows:

The conceptual design information identified above is incorporated by reference.

The U.S. EPR FSAR includes the following COL Item in Section 3.7.2.8:

> A COL applicant that references the U.S. EPR design certification will provide the seismic design basis for the sources of fire protection water supply for safe plant shutdown in the event of a SSE.

The COL Item is addressed as follows:

The U.S EPR FSAR Section 3.7.2.8 states that the Fire Protection Storage Tanks and Buildings are classified as Conventional Seismic Structures and that RG 1.189 (NRC, 2007) requires that a water supply be provided for manual firefighting in areas containing equipment for safe plant shutdown in the event of a SSE. The U.S. EPR FSAR Section 3.7.2.8 also states the fire protection storage tanks and building are designed to provide system pressure integrity under SSE loading conditions.

In addition to the Seismic Classifications defined in U.S. EPR FSAR Section 3.2.1, a seismic classification of Seismic Category II-SSE is utilized. This designation is utilized to ensure the design basis requirement that Fire Protection SSC are required to remain functional during and following a seismic event to support equipment required to achieve safe shutdown.

Refer to Section 3.2.1 and U.S. EPR FSAR Section 3.2.1 for further discussion of seismic classifications. In addition, Section 3.2.1 categorizes Fire Protection SSC into two categories:

1. SSC that must remain functional during and after an SSE (i.e., Seismic Category II-SSE); and

2. SSC that must remain intact after an SSE without deleterious interaction with Seismic Category I or Seismic Category II-SSE (i.e., Seismic Category II).

Fire Protection SSC required to remain functional during and following a safe shutdown earthquake to support safe shutdown of the plant following a design basis seismic event are designated as Seismic Category II-SSE. The following Fire Protection structures, systems, and components are required to remain functional during and after a seismic event:

1. Fire Water Storage Tanks;

2. Fire Protection Building;

3. Diesel driven fire pumps and their associated sub systems and components, including the diesel fuel oil system;

4. Critical support systems for the Fire Protection Building, i.e., ventilation; and

5. The portions of the fire water piping system and components (including isolation valves) which supply water to the stand pipes in buildings that house the equipment required for safe shutdown of the plant following an SSE.

Manual actions may be required to isolate the portion of the Fire Protection piping system that is not qualified as Seismic Category II-SSE.

U.S. EPR FSAR Section 3.7.2.8 addresses the interaction of the following Non-Seismic Category I structures with Seismic Category I structures:

- Vent Stack

- Nuclear Auxiliary Building

- Access Building

- Turbine Building

- Radioactive Waste Processing Building

{The following CCNPP Unit 3 Non-Seismic Category I structures identified in Table 3.2-1 could also potentially interact with Seismic Category I SSC:

- Buried and above ground Seismic Category II and Seismic Category II-SSE Fire Protection SSC, including Fire Water Storage Tanks and Fire Protection Building.

- Seismic Category II Turbine Building (U.S. EPR FSAR Section 3.7.2.8 also provides conceptual information to address seismic interaction of Turbine Building with the Seismic Category I SSCs)

- Seismic Category II Switchgear Building

- Conventional Seismic Grid Systems Control Building.

- Seismic Category II Circulating Water Makeup Intake Structure.

- Conventional Seismic Sheet Pile Wall.
- Existing Baffle Wall.

The buried Seismic Category II-SSE Fire Protection SSC identified in Table 3.2-1 are seismically analyzed using the design response spectra identified in Section 3.7.1.1.1.4 for use in the analysis of the Seismic Category I site-specific buried utilities. The analysis of the buried Seismic Category II-SSE fire protection SSC will confirm they remain functional during and following an SSE in accordance with NRC Regulatory Guide 1.189 (NRC, 2007). Section 3.7.3.12 further defines the methodology for the analysis of buried Fire Protection piping. Seismic Category II-SSE buried piping is an embedded commodity that by its nature does not significantly interact with above ground Seismic Category I SSC. The buried Seismic Category II-SSE Fire Protection SSCs are designed to the same requirements as the buried Seismic Category I SSCs.

The above ground Seismic Category II and Seismic Category II-SSE Fire Protection SSC, including Fire Water Storage Tanks and Fire Protection Building, identified in Table 3.2-1 are seismically analyzed utilizing the appropriate design response spectra. Seismic load combinations are developed in accordance with the requirements of ASCE 43-05 (ASCE, 2005) using a limiting acceptance condition for the structure characterized as essentially elastic behavior with no damage (i.e., Limit State D) as specified in the Standard. The analysis of the above ground Seismic Category II-SSE fire protection SSC will confirm they remain functional during and following an SSE in accordance with NRC Regulatory Guide 1.189 (NRC, 2007). The analysis of the above ground Seismic Category II fire protection SSCs will confirm they maintain a pressure boundary after an SSE event.

Table 3.7-14 provides the criteria used to prevent seismic interaction of Turbine Building, Switchgear Building, Circulating Water Makeup Intake Structure and Grid Systems Control Building with other Seismic Category I structures, systems and components (SSCs).

The Seismic Category II Turbine Building and Seismic Category II Switchgear Building together comprise a common Turbine Island (TI) structure and are situated approximately 30 ft (9.1 m) from the NI Common Basemat structures. The Switchgear Building is a steel framed structure.

The Turbine Building and Switchgear Building are designed using conventional seismic codes and standards presented in Table 3.7-14, but are also analyzed and designed using Site SSE to prevent seismic interaction with the Seismic Category I SSCs. An evaluation of the site-specific SSE responses will confirm that the separation distance between the TI structure and the Seismic Category I SSCs exceeds the sum of the maximum relative seismic displacement between the structures, construction tolerances and settlement effects by an appropriate factor of safety.

The Conventional Seismic Grid Systems Control Building is located in the Switchyard area, and has a minimum separation distance of approximately 700 ft (213.4 m) from the nearest Seismic Category I SSCs (see Figure 2.1-5). Therefore, potential collapse of this building has no adverse impact on the function of Seismic Category I SSCs. This meets NUREG-0800 Section 3.7.2, Acceptance Criterion 8.A (NRC, 2007a).

The Seismic Category II Circulating Water Makeup Intake Structure is situated between the

Seismic Category I Buried Intake Pipes and is comprised of a reinforced concrete embedded structure and an above ground steel structure. The reinforced concrete embedded structure is integrally connected to the Seismic Category I Forebay and is designed to the same requirements as a Seismic Category I structure. The Seismic Category I Buried Intake Pipes are approximately 15 ft (4.6 m) away from the embedded walls of the Circulating Water Makeup Intake Structure. Therefore, there is no possibility of any seismic interaction between the Buried Intake Pipes and the Circulating Water Makeup Intake Structure. Therefore, the design methodology for the reinforced concrete embedded structure meets NUREG-0800 Section 3.7.2, Acceptance Criterion 8.C (NRC, 2007a).

The above ground steel structure is located such that it cannot directly strike any Seismic Category I SSCs. Since the reinforced concrete embedded structure supporting the steel structure is integrally connected to the Seismic Category I Forebay, the reinforced concrete embedded structure is analyzed to demonstrate that the collapse of the steel superstructure does not impair the integrity of Seismic Category I SSCs, nor result in incapacitating injury to control room occupants.

The Conventional Seismic Unit 3 Sheet Pile Wall is located approximately 30 ft (9.1 m) from the north end of the Seismic Category I Buried Intake Pipes. The Sheet Pile Wall will be analyzed and designed using conventional seismic codes and standards but will also be analyzed using Site SSE to prevent any adverse interaction with the Seismic Category I Buried Intake Pipes. The existing Baffle Wall is approximately 46 ft (14.0 m) above the bed of the intake area and is located approximately 50 ft (15.2 m) from the north end of the Seismic Category I Buried Intake Pipes. Therefore, the interaction of the Baffle Wall with the Buried Intake Pipes is not possible.

FSAR Table 3.2-1 will be updated as follows in a future COLA revision:

Table 3.2-1 – {Classification Summary for Site-Specific SSCs}

KKS System or Component Code	SSC Description	Safety Classification (Note 1)	Quality Group Classification	Seismic Category (Note 2)	10 CFR 50 Appendix B Program	Location (Note 3)	Comments/ Commercial Code
Other Site-Specific Structures							
UBA	Switchgear Building	~~NS~~ NS-AQ	~~E~~ N/A	~~CS~~ II	No	UBA	IBC /AISC 341/AISC 360/ACI 318/ACI 349/ANSI/AISC N690
UMA	Turbine Building	~~NS~~ NS-AQ	~~E~~ N/A	~~CS~~ II	No	UMA	IBC /AISC 341/AISC 360/ACI 318/ACI 349/ANSI/AISC N690