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UniStar
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10 CFR 50.4
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March 25, 2011

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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 296, Control Room Habitability

Reference: Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy), "FINAL RAI 296 SPCV 4460" email dated March 1, 2011

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 March 1, 2011 (Reference). This RAI addresses Control Room Habitability, as discussed in Section 6.4 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 7.

The enclosure provides our responses to RAI 296, Questions 06.04-5 and 06.04-6, 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.

Our responses do not include any new regulatory commitments. This letter does not contain any sensitive or proprietary information.

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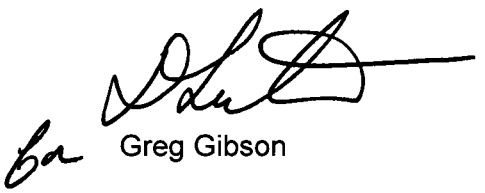
NRO

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 March 25, 2011



Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI 296, Questions 06.04-5 and 06.04-6, Control Room Habitability, 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)
Charles Casto, 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 296,
Questions 06.04-5 and 06.04-6, Control Room Habitability,
Calvert Cliffs Nuclear Power Plant, Unit 3**

RAI 296

Question 06.04-5

Operators Training and Procedures

GDC 19 requires that control rooms be maintained in safe condition under accident conditions, including loss of coolant accidents. Additional recommendations are contained in RG 1.196.

The level of detail provided in CCNPP Unit 3 COL FSAR Section 6.4.3 is not adequate to determine if the regulatory requirements are met. Provide in the FSAR the essential elements of the training procedures necessary to demonstrate that the regulatory requirements are met. Specifically, what will operators be directed and trained to do to meet the recommendations in RG 1.196.

Please address / discuss the applicability of the following:

- Regulatory Position C5, "Emergency Planning" of Regulatory Guide 1.78
- Regulatory Position 2.5, "Hazardous Chemicals" of Regulatory Guide 1.196
- Regulatory Position 2.2.1, "Comparison of System Design, Configuration, and Operation with the Licensing Basis" of Regulatory Guide 1.196; and
- Regulatory Position 2.7.1, "Periodic Evaluations and Maintenance" of Regulatory Guide 1.196

Include a discussion of what operators will be directed to do when they smell toxic gas or are notified by external sources that there was a toxic gas release. Include a discussion of any arrangements that will be in place for notifying the control room when a release has occurred.

Response

The Calvert Cliffs Nuclear Power Plant Unit 3 COLA will be revised to include additional details of operator's actions and training during toxic gas release scenarios. See COLA Impact. (follows)

COLA Impact

FSAR Section 6.4.3 is being updated as follows:

6.4.3 System Operational Procedures

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements {and departures}.

The U.S. EPR FSAR includes the following COL Item in Section 6.4.3:

> A COL applicant that references the U.S. EPR design certification will provide written emergency planning and procedures in the event of a radiological or hazardous chemical release within or near the plant, and will provide training of control room personnel.

This COL Item is addressed as follows:

{Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC} shall provide written emergency planning and procedures for use in the event of a radiological or hazardous chemical release within or near the plant, and will provide training of control room personnel, prior to receipt of fuel onsite at {CCNPP Unit 3}.

{The procedures and training address the toxic chemical events addressed in Sections 2.2 and 6.4 consistent with the guidance provided in regulatory position C.5 of Regulatory Guide 1.78 (NRC, 2001), including arrangements with Federal, State, and local agencies or other cognizant organizations for the prompt notification of the nuclear power plant when accidents involving hazardous chemicals occur within five miles of the plant. The procedures include the conduct of periodic surveys of stationary and mobile sources of hazardous chemicals affecting the evaluations consistent with the guidance provided in regulatory position 2.5 of Regulatory Guide 1.196 (NRC, 2007a). The procedures include appropriate reviews of the configuration of the control room envelope and habitability systems consistent with the guidance provided in regulatory position 2.2.1 of Regulatory Guide 1.196 (NRC, 2007a). The procedures also include periodic assessment of control room habitability systems' material condition, configuration controls, safety analyses, and operating and maintenance procedures consistent with the guidance provided in regulatory position 2.2.1 of Regulatory Guide 1.196 (NRC, 2007a).

Procedures for testing and maintenance are consistent with the guidance provided in regulatory position 2.7.1 of Regulatory Guide 1.196 (NRC, 2007a).

{For CCNPP Unit 3, detection of toxic gases and subsequent isolation of the CRE is not required and is not part of the site-specific system operation. The evaluation of the CCNPP Unit 3 toxic chemicals in Section 2.2.3 did not identify any credible toxic chemical accidents that exceed the limits established in Regulatory Guide 1.78 (NRC, 2001). No specific provisions are required to protect the operators from an event involving the release of a toxic gas. As a result, toxic gas detectors and isolation are not required and will not be provided at CCNPP Unit 3.}

Question 06.04-6

Follow-up question to RAI 83, Question 06.04-4:

The following question is related to Unit 3 Control Room Habitability in case of Unit 1 or 2 DBAs. GDC 19 requires that control room occupants must be protected from radiation exposure of nearby units' DBAs. COL applicants either have to confirm that the radiation exposure of MCR occupants resulting from a DBA at a nearby unit is bounded by the radiation exposure analysis of the DC plant, or confirm that the limits of GDC 19 are met.

The response to RAI 83, Question 06.04-4 showed that the U.S. EPR radiological analysis bounds the radiological consequences of a DBA either at Unit 1 or Unit 2 and proposed a revision to Section 6.2.4 of the CCNPP Unit 3 FSAR. The staff has determined that more information is necessary to determine if GDC 19 is met.

Provide a new revision to Section 6.2.4 of the CCNPP Unit 3 COL FSAR that addresses the habitability of the Unit 3 control room without discussing the habitability of the Unit 1 or Unit 2 control room, and describe in detail the logic that led to the conclusion that the U.S. EPR radiological analysis bounds the consequences of DBAs either at Unit 1 or Unit 2.

Response

The impacted Tier 2 CCNPP Unit 3 COLA FSAR Section is 6.4.4, and not 6.2.4 as listed in the question.

The CCNPP Unit 3 MCR habitability was evaluated for a Loss of Coolant Accident (LOCA) at CCNPP Unit 2 as this is more bounding than a LOCA at Unit 1 due to the distance between the units. The analysis was based on the guidance provided in Regulatory Guide 1.183 and the NRC-approved RADTRAD model in the Safety Evaluation for the Units 1 and 2 implementation of the Alternative Radiological Source Term, with the following modifications:

- Use of site-specific atmospheric dispersion factors for transport of post-LOCA releases from Unit 2 to the Unit 3 MCR intake for filtered air flow and unfiltered in-leakage, as shown in Table 1, and
- Use of the Unit 3 MCR characteristics as given in U.S. EPR FSAR Table 15.0-18 with one exception- actuation of the MCR emergency filtration system (for filtered intake flow and filtered recirculation) was based on 30-minute operator action, in lieu of automatic actuation as a result of high radiation levels in the intake duct. Although it is expected that the emergency filtration system would get actuated by the intake duct radiation monitors in less than 30 minutes, this was not credited in the analysis.

It was determined that the Unit 3 MCR dose from a Unit 2 LOCA would be 0.2 rem TEDE, which is significantly lower than the acceptance criterion in 10 CFR 50, Appendix A, GDC 19, as incorporated by reference in 10 CFR 52.79(a)(4)(i) (5 rem TEDE).

With respect to direct shine to MCR personnel from post-LOCA external and contained sources, it was determined that their contribution to the total dose would be minimal. Radiation emanating from the external plume would be attenuated by the 6-ft concrete structure protecting the Unit 3 MCR, and radiation emanating from the MCR charcoal filtration system would be shielded by a 50-cm concrete floor.

Table 1: Unit 2 LOCA Accident Atmospheric Dispersion Factors (χ/Q) for CCNPP Unit 3 MCR Habitability Analysis

Time Period	Atmospheric Dispersion Factors (sec/m^3) for the Closest Unit 2 Post-LOCA Release Point[1]
0 to 2 hrs	3.377E-04
2 to 8 hrs	1.973E-04
8 to 24 hrs	1.221E-04
1 to 4 days	5.851E-05
4 to 30 days	2.035E-05

[1] Atmospheric dispersion factors conservatively applied to all CCNPP Unit 2 Post-LOCA release points

COLA Impact

FSAR Section 6.4.4 is being updated as follows:

6.4.4 Design Evaluations

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements {and departures}.

The U.S. EPR FSAR includes the following COL Item in Section 6.4.4:

> A COL applicant that references the U.S. EPR design certification will confirm that the radiation exposure of MCR occupants resulting from a DBA at a nearby unit on a multi-unit site is bounded by the radiation exposure from the postulated design basis accidents analyzed for the U.S. EPR; or confirm that the limits of GDC 19 are met.

This COL Item is addressed as follows:

~~{The main control room (MCR) dose to CCNPP Units 1 and 2 from a CCNPP Unit 3 LOCA is less than 2.0 rem total effective dose equivalent (TEDE). This dose is below the regulatory dose acceptance criterion of 5 rem TEDE. The CCNPP Unit 3 MCR dose from a LOCA in CCNPP Unit 1 or 2 will be less than CCNPP Units 1 and 2 dose from a CCNPP Unit 3 LOCA, which also meets the regulatory dose acceptance criterion of 5 rem TEDE.~~

~~The CCNPP Unit 3 MCR is equipped with safety-related radiation monitors in the HVAC intake ducts and would isolate in a timely manner. The CCNPP Unit 3 MCR HVAC emergency filtration system design basis accident configuration is described in U.S. EPR FSAR 15.0.3.}~~

{The CCNPP Unit 3 main control room (MCR) habitability was evaluated for a Loss of Coolant Accident (LOCA) at CCNPP Unit 2. A CCNPP Unit 2 LOCA is more bounding than a LOCA at CCNPP Unit 1 due to the distance between the units. The analysis was based on the guidance provided in Regulatory Guide 1.183 (NRC, 2000) and the NRC-approved RADTRAD model in the Safety Evaluation for the CCNPP Units 1 and 2 implementation of the Alternative Radiological Source Term (NRC, 2007b), with the following modifications:

- Use of site-specific atmospheric dispersion factors for transport of post-LOCA releases from CCNPP Unit 2 to the CCNPP Unit 3 MCR intake for filtered air flow and unfiltered in-leakage, as shown in Table 6.4-1, and

- Use of the CCNPP Unit 3 MCR characteristics as given in U.S. EPR FSAR Table 15.0-18 with one exception - actuation of the MCR emergency filtration system (for filtered intake flow and filtered recirculation) was based on 30-minute operator action, in lieu of automatic actuation as a result of high radiation levels in the intake duct. Although it is expected that the emergency filtration system would get actuated by the intake duct radiation monitors in less than 30 minutes, this was not credited in the analysis.

It was determined that the CCNPP Unit 3 MCR dose from a CCNPP Unit 2 LOCA would be 0.2 rem TEDE, which is significantly lower than the acceptance criterion in 10 CFR 50, Appendix A, GDC 19, as incorporated by reference in 10 CFR 52.79(a)(4)(i) (5 rem TEDE).

With respect to direct shine to MCR personnel from post-LOCA external and contained sources, it was determined that their contribution to the total dose would be minimal. Radiation emanating from the external plume would be attenuated by the 6-ft concrete structure protecting the CCNPP Unit 3 MCR, and radiation emanating from the MCR charcoal filtration system would be shielded by a 50-cm concrete floor.}

FSAR Section 6.4.7 is being updated as follows:

6.4.7 References

{**NRC, 2000.** Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," Rev. 0, U.S. Nuclear Regulatory Commission, July 2000.

NRC, 2001. Evaluating the Habitability of a Nuclear Power Plant Control Room during a Postulated Hazardous Chemical Release, Regulatory Guide 1.78, Revision 1, U.S. Nuclear Regulatory Commission, December 2001.}

NRC, 2007a. Control Room Habitability at Light-Water Nuclear Power Reactors, Regulatory Guide 1.196, Revision 1, U.S. Nuclear Regulatory Commission, January 2007.

NRC, 2007b. Letter from D. V. Picket, Senior Project Manager, U.S. Nuclear Regulatory Commission to J. A. Spina, Vice President, Calvert Cliffs Nuclear Power Plant, Inc. titled "Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 - Amendment Re: Implementation of Alternative Radiological Source Term (TAC Nos. MC8845 and MC8846), dated August 29, 2007 (ADAMS Accession No. ML072130521)}

FSAR Table 6.4-1 is being added as follows:

Table 6.4-1 – {Unit 2 LOCA Accident Atmospheric Dispersion Factors (χ/Q) for CCNPP Unit 3 MCR Habitability Analysis}

Time Period	Atmospheric Dispersion Factors (sec/m^3) for the Closest Unit 2 Post-LOCA Release Point[1]
0 to 2 hrs	3.377E-04
2 to 8 hrs	1.973E-04
8 to 24 hrs	1.221E-04
1 to 4 days	5.851E-05
4 to 30 days	2.035E-05

[1] Atmospheric dispersion factors conservatively applied to all CCNPP Unit 2 Post-LOCA release points