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UniStar
NUCLEAR ENERGY

10 CFR 50.4
10 CFR 52.79

June 3, 2011

UN#11-173

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 279, Ultimate Heat Sink

Reference:
1) Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy), "FINAL RAI 279 SBPA 2618" email dated January 21, 2011

2) UniStar Nuclear Energy Letter UN#11-118, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 279, Ultimate Heat Sink, dated March 31, 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 January 21, 2011 (Reference 1). RAI 279 addresses the Ultimate Heat Sink, as discussed in Section 9.2.5 of the Final Safety Analysis Report (FSAR), as submitted in Part 2 of the Calvert Cliffs Nuclear Power Plant, Unit 3 Combined License Application (COLA), Revision 7.

Reference 2 provided a response date of June 3, 2011, for Questions 09.02.05-5, 09.02.05-6, 09.02.05-8, 09.02.05-12, 09.02.05-14, and 09.02.05-17.

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The Enclosure provides our response to RAI No. 279 Questions 09.02.05-5, 09.02.05-8, and 09.02.05-14, 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.

UniStar Nuclear Energy requires additional time to finalize the responses to the remaining RAI 279 questions. Responses to Questions 09.02.05-6, 09.02.05-12, and 09.02.05-17 will be provided to the NRC by June 30, 2011. Responses to Questions 09.02.05-4, 7, 9, 10, 11, 13, 15, and 16 remain as originally scheduled in Reference 2 as June 30, 2011.

There are no regulatory commitments identified in this letter. 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 June 3, 2011

Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI No. 279, Questions 09.02.05-5, 09.02.05-8, and 09.02.05-14, Ultimate Heat Sink, 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
Charles Casto, Deputy Regional Administrator, NRC Region II
Silas Kennedy, U.S. NRC Resident Inspector, CCNPP, Units 1 and 2
U.S. NRC Region I Office

Enclosure
Response to NRC Request for Additional Information RAI No. 279,
Questions 09.02.05-5, 09.02.05-8, and 09.02.05-14,
Ultimate Heat Sink,
Calvert Cliffs Nuclear Power Plant, Unit 3

RAI No. 279

NRC Question 09.02.05-5

The ultimate heat sink (UHS) must be able to withstand natural phenomena without the loss of function in accordance with General Design Criteria (GDC) 2 requirements. CCNPP Unit 3 FSAR Section 9.2.5.5, "Safety Evaluation," states that the set of traveling screens for the UHS makeup water intake structure meets seismic category II requirements and are large enough to preclude the occurrence of their being blocked to the extent that minimum required flow of water cannot be maintained. Based on the staff's review of the UHS travelling screen and screen wash design the applicant described in FSAR Section 9.2.5.3, "Component Description," and Table 3.2-1, "Classification Summary for Site-Specific SSCs," it was determined that the support systems for the UHS makeup are designed as non-safety related. The staff determined that the non-safety related classification of the travelling screen and screen wash system may be inappropriate since its failure to provide a water flow path to the UHS makeup pumps may effect the ability of the UHS to perform its intended function for up to 30 days. Describe in the FSAR Section 9.2.5.5, related to the natural phenomena events (earthquakes, tornadoes, hurricanes, floods, external missiles and other natural phenomena), the capability of the UHS makeup system to perform its intended safety related function between 72 hours and up to 30 days with the support systems such as screen wash and travelling screens designed as non-safety related.

Response

NRC issued RAI 279, Question 09.02.05-5 based on review of Calvert Cliffs Nuclear Power Plant Unit 3 (CCNPP Unit 3) COLA, Revision 6, FSAR Section 9.2.5. On December 20, 2010, UniStar submitted CCNPP Unit 3 COLA Revision 7 which included changes to FSAR Table 3.2-1 and FSAR Section 9.2.5. This response takes into account the changes submitted in COLA Revision 7, as discussed below.

COLA Revision 7 included a change to the safety classification of the UHS makeup water traveling screens and screen wash pumps in FSAR Table 3.2-1 from non safety-related to NS-AQ (Supplemental Grade [UniStar Quality Assurance Program Description (QAPD) classification – QA Level 2]). The seismic classification for this equipment was not changed from Category II; however, Note 9 was added to indicate that, "The UHS Makeup dual-flow traveling screens are designed to withstand design basis seismic loads without a loss of their mechanical function and are designed to permit manual operator rotation of the traveling screens and cleaning of the screen panels." The screen wash system components (e.g., screen wash pumps) are classified as NS-AQ and are designed as Seismic Category II, but are not credited for Design Basis Accident (DBA) mitigation.

In addition, COLA Revision 7, FSAR Subsection 9.2.5.3.2, under the subheading UHS Makeup Water Intake Structure Bar Screens and Traveling Screens, was revised to add the following clarification:

> These traveling screens are classified as NS-AQ and are designed to remain mechanically functional following an SSE. The ability to manually rotate and clean the travelling screens to ensure adequate flow to the UHS makeup water pumps following a DBA is also provided. The structure housing the traveling screens will protect them from other natural phenomena, e.g. hurricane, tornado. The structure also provides separation between the screens for each of the four divisions. During normal operation,

> the traveling screens are powered from the Normal Power Supply System. Backup (Class 1E) power supply is provided to operate the traveling screens post-DBA through the Emergency Power Supply System, for convenience, if the electrical components of the traveling screens are functional post DBA.

Additionally, in COLA Revision 7 FSAR Subsection 9.2.5.5, the ninth bulleted item was revised as below:

> Has a set of traveling screens that remain mechanically functional following an SSE. The ability to manually rotate and clean the traveling screens to ensure adequate flow to the UHS makeup water pumps following a DBA is also provided.

Based on the above changes in CCNPP Unit 3 COLA Revision 7, the UHS makeup water traveling screens are designed to ensure the ability of the UHS makeup system to perform its intended safety-related function between 72 hours and up to 30 days following a DBA.

COLA Impact

FSAR Table 3.2-1, Note 9 and FSAR Section 9.2.5.3.2 are being updated as follows:

FSAR Table 3.2-1 - {Classification Summary for Site-Specific SSCs}, Note 9

The UHS Makeup dual-flow traveling screens, spray nozzles, spray nozzle header, alternate connection, and motor operated isolation valve are designed to withstand design basis seismic loads without a loss of their mechanical function and are designed to permit manual operator rotation and cleaning of the screen panels.

FSAR 9.2.5.3.2

...

Screen Wash System Components

The screen wash system consists of one screen wash pump, associated piping, valves and instruments for each train. The screen wash system components are classified as NS-AQ, and are designed as Seismic Category II, but are not credited for DBA mitigation because Class 1E backup power supply is not provided. However, the screen wash system spray nozzles, spray nozzle header, alternate connection, and motor operated isolation valve are designed to withstand design basis seismic loads in order to permit manual operator actions for cleaning of the screen panels. All of these components are constructed of materials compatible with the brackish UHS makeup water.

RAI No. 279

NRC Question 09.02.05-8

General Design Criteria (GDC) 44 requires that "A system to transfer heat from structures, systems, and components important to safety, to an ultimate heat sink shall be provided." This function must also be met in the event of a loss of off-site power assuming a single failure. The staff noted that assurance of separation between safety and non-safety portions of the system is therefore necessary for compliance with GDC 44. In addition, three U.S. EPR FSAR identified COL items (items 2.3-10, 2.4-9 and 2.4-10) that have not been adequately discussed by the applicant.

a. No discussion of an actual accident isolation signal was located by the staff for the normal blowdown isolation valves as described in CCNPP Unit 3 FSAR Section 9.2.5. In the condition that alternate blowdown is open during normal operation, describe any operator actions or isolation signals to close this open valve to support accident conditions. It is expected that the blowdown valve or alternate blowdown valves on more than one train could be open during normal operation; however, basin makeup can be lost for the first 72 hours of an accident resulting in basin volume loss through the blowdown path on more than one train.

b. No discussion of compliance with RG 1.27 or GDC 44 was located by the staff in FSAR, Section 9.2.5.5, "Safety Evaluation." The applicant needs to provide this statement in the FSAR.

c. U.S. EPR COL item 2.3-10 states that a COL applicant that references the U.S. EPR design certification will describe the means for providing UHS makeup sufficient to meet the maximum evaporative and drift water loss after 72 hours through the remainder of the 30 day period consistent with RG 1.27. The applicant needs to clarify this statement due to Regulatory Guide 1.27, Rev 2, Jan 1976, Section C3, which states in part the UHS should consist of at least two highly reliable water sources.

d. No discussion was found in the CCNPP Unit 3 FSAR, Section 9.2.5 related to COL Item 2.4-9, which states, "A COL applicant that references the U.S. EPR design certification will provide site-specific information and describe the design basis for cooling water canals and reservoirs used for makeup to the UHS cooling tower basins." The applicant needs to provide this discussion in the FSAR.

e. No discussion was found in the CCNPP Unit 3 FSAR, Section 9.2.5 related to COL Item 2.4-10, which states, "A COL applicant that references the U.S. EPR design certification will provide site-specific information and demonstrate that in the event of upstream diversion or rerouting of the source of cooling water, alternate water supplies will be available to safety-related equipment." The applicant needs to provide this discussion in the FSAR.

Response to item a:

The safety-related blowdown and alternate blowdown valves for the Essential Service Water (ESW) system are a part of the standard plant design. The Supplement 9 response to U.S. EPR FSAR RAI 345, Question 09.02.01-42 (a) describes the operation of these valves (ML103090066).

Response to item b:

U.S. EPR FSAR, Section 9.2.5, (Ultimate Heat Sink) discusses conformance of the UHS with Regulatory Guide 1.27 (Ultimate Heat Sink for Nuclear Power Plants). U.S. EPR FSAR Subsection 9.2.5.1, discusses compliance of the UHS with GDC 44.

CCNPP Unit 3 COLA Revision 7, FSAR Section 9.2.5 (Ultimate Heat Sink) describes the site specific normal and emergency makeup water systems that meet the applicable requirements of the Regulatory Guide 1.27 or GDC 44. CCNPP Unit 3 COLA FSAR Subsection 9.2.5.5 (Safety Evaluation) will be revised to state that the normal and emergency makeup water systems meet the requirements of Regulatory Guide 1.27 and GDC 44.

Response to item c:

CCNPP Unit 3 FSAR Subsection 2.3.1.2 (Meteorological Data for Evaluating the Ultimate Heat Sink) addresses COL Item 2.3-10. Our previous response to CCNPP Unit 3 COLA FSAR RAI 277[1], Question 09.02.01-1, states that the makeup pump capacity exceeds the EPR required makeup flow.

As stated in CCNPP Unit 3 COLA FSAR Section 9.2.5.2.3 (UHS Makeup Water System), the emergency makeup water is provided by the site-specific, safety-related UHS makeup water system that draws water from Chesapeake Bay. This meets the requirement of Regulatory Guide 1.27, Regulatory Position C3, regarding the acceptability of a single source for makeup water, as the probability of loss of this single source (Atlantic Ocean) is extremely low. The pipes connecting the UHS Makeup Water System forebay to the Chesapeake Bay are redundant as described in CCNPP Unit 3 COLA FSAR Subsection 9.2.5.2.3.

Response to item d:

CCNPP Unit 3 COLA FSAR Section 2.4.8 addresses COL Item 2.4-9.

Response to item e:

CCNPP Unit 3 COLA FSAR Section 2.4.9 addresses COL Item 2.4-10.

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[1] UniStar Nuclear Energy Letter UN#11-123, from Greg Gibson to Document Control Desk, U.S. NRC, Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3, RAI No. 277, Essential Service Water System, dated April 1, 2011

COLA Impact

FSAR Section 9.2.5.5 is being updated as follows:

9.2.5.5 Safety Evaluation

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This function is assured because the UHS Makeup Water System:

♦ Meets the requirements of Regulatory Guide 1.27 and GDC 44.

♦ Is designed, procured, constructed and operated in accordance with the criteria for ASME Section III, Class 3 safety-related systems, structures and components, and Seismic Category 1 requirements, including the tie-in piping and isolation valves for normal makeup, and chemical addition and sampling.

RAI No. 279

NRC Question 09.02.05-14

General Design Criteria (GDC) 45 requires the ultimate heat sink (UHS) and UHS makeup water system to be designed so that periodic inspections of piping and components can be performed to assure that the integrity and capability of the system will be maintained over time. CCNPP Unit 3 FSAR Section 9.2.5.6 indicates that periodic inspections will be performed, but does not describe the extent and nature of these inspections and the procedural controls that will be implemented to assure that the UHS is adequately maintained over time. The accessibility and periodic inspection of safety related buried piping and yard MOVs is of particular interest. Provide additional information in FSAR Section 9.2.5 to describe the extent and nature of inspections that will be performed and the procedural controls that will be implemented commensurate with the GDC 45 requirement. Also, confirm in the FSAR that the UHS makeup water system complies with GDC 45.

Response

The UHS Makeup Water System is a safety-related ASME Code Class 3 system. This system has relatively small diameter underground carbon steel piping that is coated with 2-layer fusion bonded epoxy both on the exterior and interior surfaces. Additionally, exterior surfaces exposed to the soil shall be cathodically protected. Normally, the system piping is in dry lay up. The system is required to operate only under the accident conditions. At that time, the system is filled with Chesapeake Bay water and is ready to operate, 72 hours post accident. Water used for periodic inspections and testing is chemically treated to minimize any potential for corrosion and bio-fouling. After each fill, the system is completely drained for dry layup. Piping is sloped to preclude any water pooling. Low point drains are provided to facilitate system drainage. Since the system remains dry essentially all of the time, the potential for any erosion, corrosion and bio-fouling is minimal.

Inservice inspections of the UHS makeup water system piping (both above ground and buried) are performed in accordance with the requirements of ASME Section XI and ASME OM Code, per CCNPP Unit 3 COLA FSAR Table 13.4-1. Per ASME Section XI paragraph IWA-5244, the buried UHS Makeup Water System piping will be inspected by performing a test that determines the change in flow rate between each end of the above ground portions, or a test that determines the rate of pressure loss in the buried piping-segments, isolatable at each end of the pipe by the safety-related valves, located in the UHS Makeup Water Intake Structure and in the ESWS Pump House. Inservice inspection of the buried piping via the flow or pressure test, per the ASME Section XI Code Tables IWD-2411-1 and Table IWD-2500-1 is required to be performed once every 10 year interval. For additional assurance of system integrity and availability, since most piping is buried, the requirement for inspection by testing will be performed every 4 years, coincident with alternate test cycles of U.S. EPR Generic Technical Specifications Surveillance Requirement (SR) 3.7.19.5 for the UHS Makeup Water System.

Safety-related MOVs and pumps are located above ground in Seismic Category I structures and are readily accessible for ASME OM Code testing and examinations. Additional ASME OM Code details will be discussed in the response to RAI 279, Question 09.02.05-15 .

The inspection and testing provisions described above are subject to programmatic requirements and procedural controls as described in CCNPP Unit 3 FSAR Section 13.5.

The established inspection and maintenance program assure the integrity and capability of the UHS and UHS makeup water system over time in accordance with the requirements of GDC 45.

COLA Impact

FSAR Sections 6.6.2, 6.6.4, 9.2.5.1, and 9.2.5.6 are being updated as follows:

6.6.2 Accessibility

~~No departures or supplements.~~

{This section of the U.S. EPR FSAR is incorporated by reference with the following supplement.

Design considerations other than access provisions described in ASME Section XI paragraph IWA-1500, will be needed for specific buried UHS Makeup Water System components to render inservice inspections practical. In lieu of a visual examination of buried components, the examination requirement shall be satisfied by performing a test that determines the rate of pressure loss or a test that determines the change in flow rate between the isolation valves at each end of the buried piping-segment, in accordance with ASME Section XI, paragraph IWA-5244.}

6.6.4 Inspection Intervals

~~{No departures or supplements.}~~

{This section of the U.S. EPR FSAR is incorporated by reference with the following supplement.

Testing will be performed to determine the rate of pressure loss or the change in flow rate between the ends of buried components (i.e. to verify any leak) coincident with alternate test cycles of U.S. EPR Generic Technical Specification Surveillance Requirement (SR) 3.7.19.5 for the UHS Makeup Water System. Since most of the piping is buried, for additional assurance of system integrity and availability, testing will be performed at the 4-year frequency, which conservatively bounds the requirements per ASME Section XI, paragraph IWD-2411 and Tables IWD-2411-1 and IWD-2500-1.}

9.2.5.1 Design Basis

...

The ESWS makeup chemical treatment system provides a means for adding chemicals to the UHS makeup water and to the normal ESWS makeup water. This is done to limit corrosion, scaling, and biological contaminants in order to minimize component fouling.}

The UHS Makeup Water System is designed to permit periodic inspection of components necessary to maintain the integrity and capability of the system to comply with 10 CFR 50 Appendix A, General Design Criterion 45.}

9.2.5.6 Inspection and Testing Requirements

The UHS Makeup Water System components, including the safety-related motor operated isolation valves for makeup and blowdown, and the safety-related isolation valves for chemical treatment and sampling, are procured and fabricated in accordance with the quality

requirements for safety-related ASME Section III, Class 3 systems, structures and components to ensure compliance with approved specifications and design documents.

Installation of individual components and overall system construction are inspected to verify the as-built condition is in accordance with approved drawings. Performance testing upon completion of construction verifies the system's ability to perform its design safety function.

Inservice inspection of the UHS Makeup Water System including piping, valves, pumps and components is performed as identified in Section 6.6, in accordance with the requirements of ASME Section XI and ASME OM Code. The installation and design of the UHS Makeup Water System provides accessibility, as described in Section 6.6.2, for the performance of periodic inservice inspection. The frequency of inservice inspection, via flow or pressure tests, for buried piping segments is described in Section 6.6.4, to ensure system integrity beyond the ASME Section XI code requirement.

Finally, in accordance with U.S. EPR Surveillance Requirements provided in Chapter 16, periodic surveillance testing of the system, including the safety-related isolation valves, provides continuing assurance of the system's ongoing capability to perform its design function. Surveillance testing includes system performance tests and inspection of individual components, as appropriate to their importance to system function and their tendency to degrade due to their operational conditions and environment.

The inspection and testing provisions described above are subject to programmatic requirements and procedural controls as described in Section 13.5.