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UniStar
NUCLEAR ENERGY

10 CFR 50.4
10 CFR 52.79

August 19, 2011

UN#11-230

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#11-213, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 279, Ultimate Heat Sink, dated July 29, 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 August 19, 2011, for RAI Question 09.02.05-7.

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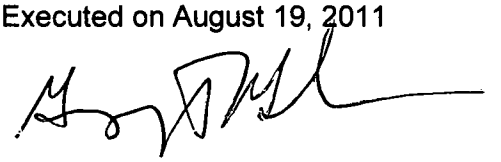
The Enclosure provides our response to RAI No. 279 Question 09.02.05-7, and includes revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA.

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 August 19, 2011



Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI No. 279, Question 09.02.05-7, 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,
Question 09.02.05-7, Ultimate Heat Sink,
Calvert Cliffs Nuclear Power Plant, Unit 3

RAI No. 279

NRC Question 09.02.05-7

According to Standard Review Plan (SRP) 9.2.5 the overall arrangement of the ultimate heat sink (UHS) and, in this case, the UHS makeup which is outside the scope of the U.S. EPR design certification needs to comply with GDC 44. The description of the UHS in CCNPP Unit 3 Final Safety Analysis Report (FSAR) Section 9.2.5 and the drawing in FSAR Figure 9.2-3 are incomplete or inaccurate. Revise the FSAR to address the following considerations:

- Pipe sizes are not shown on FSAR Figure 9.2-3, "Normal Makeup, UHS Makeup, Blowdown & Chemical Treatment," and the system description in Section 9.2.5 does not explain the criteria that were used in establishing the appropriate pipe sizes (such as limiting flow velocities).
- The system description in FSAR Section 9.2.5 does not provide design details such as system operating temperatures, pressures, and flow rates for all operating modes and alignments.
- FSAR Figure 9.2-3 does not show the location of indications (e.g., local, remote panel, control room, remote shutdown panel), and does not identify the instruments that provide input to a process computer and/or have alarm and automatic actuation functions.
- FSAR Figure 9.2-3 does not identify the normal valve positions, the valves that are locked in position, and the valves that have automatic functions. These design features are not described in FSAR Section 9.2.5.When FSAR Figure 9.2-3 is compared to U.S. EPR FSAR Figure 9.2.5-1, "Ultimate Heat Sink Piping and Instrumentation Diagram," the drawings do not appear to match up with respect to boundaries for the normal makeup and UHS makeup.
- FSAR Figure should be corrected to agree with the U.S. EPR DCD FSAR Figure 9.2.5-1. FSAR Figure 9.2-3 safety related components, for example motor operated valves (MOVs), are not labeled with identification numbers.
- FSAR Figure 9.2-3 shows safety related MOVs that appear to be not located in any safety related buildings and possibly buried. Clarify the exact locations of all safety related components for the UHS.
- FSAR Section 9.2.5 does not specifically describe the material to be used for above ground pipe or buried pipe, other than stating that the material will be compatible with brackish water or chemical associated with the chemicals utilized in the treatment of the system. Note that Part 10, ITAAC Table 2.4.24, "UHS Makeup Water System Inspections, Tests, Analysis and Acceptance Criteria," states that the materials are either carbon steel with a rubber liner or stainless steel.
- FSAR Figure 9.2-3 does not show the screen wash system or travelling screens.
- FSAR Figure 9.2-3 refers to an alternate blowdown line and the EPR FSAR Figure 9.2.1-1 refers to an emergency blowdown line. Determine if the terminology should be changed to be consistent, or indicate that these are different piping systems.
- FSAR Figure 9.2-3 should label the "UHS makeup" line as essential service water system (ESWS) emergency makeup to be consistent with Section 9.2.5.
- FSAR Figure 9.2-3 is incorrect and does not show the ESWS pumps at the UHS basin. It appears the blowdown piping system is off the UHS basin and not on the ESWS pump discharge; this should be corrected in FSAR Figure 9.2-3.
- FSAR Section 9.2.5 does not provide a discussion on support for severe accident related to ESWS, train four.

- FSAR Figure 9.2-3 does not show strainer MOVs as described in Table 8.1-1 through Table 8.1-4, "Division 1,2,3,4 Emergency Diesel Generator Nominal Loads."
- FSAR Section 9.2.5 does not specifically describe the ESW basin level controller (automatically or manually) when in normal makeup or safety related UHS makeup. Describe the types of valves which are used for controls (gates, globes, butterfly, etc).
- FSAR Section 9.2.5 does not provide a discussion for the ESW makeup pumps screens which are typically installed on vertical pumps at the suction.
- FSAR Section 9.2.5.1 states that ESWS cooling tower blow-down discharges up 231 lpm (61 gpm) of water from each operating ESWS cooling tower basin to the retention basin to maintain ESWS chemistry. This quantity is based on maintaining ten cycles of concentration in the cooling tower basin, plus evaporative losses during shutdown and cooldown, with ambient conditions at 27° C (81° F) design wet bulb temperature and coincident 46° C (115° F) dry bulb temperature. Provide an explanation and clarify the basis for this statement.
- FSAR Figure 9.2-3 shows a safety related motor operated valve for the sample; however, it is not described in detail if this valve has a logic signal to close on an accident signal.
- FSAR Section 9.2.5 does not provide a discussion for freeze protection, such as heat tracing which has diesel backed power, for the UHS makeup system for up to 30 days post accident.
- FSAR Section 9.2.5 does not provide a discussion for flooding consequences of the non-safety related piping system from the desalinization plant up to the safety related boundary valves or downstream of the safety related blowdown isolation valves.
- FSAR Figure 9.2-3 shows a chemical addition pipe directing flow to the suction of each UHS makeup pump. Describe the installation of this piping system related to seismic supports and effects on the UHS makeup pumps during a seismic event.

Response

NRC Question 09.02.05-7, (Bullet No. 1) [Pipe Size and Sizing Criteria]:

Pipe diameters for branches of the UHS Makeup Water system are based on limiting the flow velocity to 10 ft/sec for normal mode of operation (during Design Basis Accident). Pipe diameters for normal makeup, normal and emergency blowdown lines are also based on limiting the flow velocity to 10 ft/sec for normal operation, shutdown/cooldown, and DBA conditions. CCNPP Unit 3 COLA FSAR Subsection 9.2.5.3.2 will be revised to reflect this information.

NRC Question 09.02.05-7, (Bullet No. 2) [Design Conditions for UHS Makeup Water System]:

CCNPP Unit 3 COLA FSAR will be revised to add Table 9.2-1 to reflect the UHS Makeup Water system design temperatures, pressure and flow rate as shown below. Table 9.2-1 shows the design parameters during post DBA as this is the most pertinent operating mode.

Table 9.2-1 – Design Parameters-UHS Makeup Water System				
Temperature (° F)	**Flow Rate (gpm)**		**Design Pressure (psig)**	**Comments**
Max	Min	Max	170	Design parameters during Post DBA.
100	300	750		

NRC Question 09.02.05-7, (Bullet No. 3) [Location of Instruments]:

CCNPP Unit 3 COLA FSAR Figure 9.2-3 is a conceptual figure to provide information on the interfaces of UHS Makeup Water system with the Essential Service Water (ESW) system. Figure 9.2-9 depicts level of instrumentation and controls consistent with the figures in the U.S. EPR FSAR. UHS Makeup Water flow rate, pressure, differential water level across screens, strainer differential pressure, open or closed valve position status and energized or de-energized pump operating status are available in the main control room (MCR) for the operation of the system.

CCNPP Unit 3 COLA FSAR Table 9.2-2 will be added to indicate which alarms are provided in the MCR. The associated instruments provide input to the process computer and/or have alarm and automatic actuation functions. CCNPP Unit 3 COLA FSAR Table 9.2-2 will also show the various alarms and set points for UHS Makeup Water system. CCNPP Unit 3 COLA FSAR Figure 9.2-9 will be revised to show which valves are monitored for valve position. CCNPP Unit 3 COLA FSAR Subsection 9.2.5.7.1 will be added to provide system parameters that are monitored for the UHS Makeup Water system. CCNPP Unit 3 COLA FSAR Subsection 9.2.5.7.2 will be added to include system alarms for the UHS Makeup Water System. CCNPP Unit 3 COLA FSAR Subsection 9.2.5.7.3 will be added to include safety-related Instrument and Control functions for the UHS Makeup Water system.

Refer to CCNPP Unit 3 COLA FSAR Figure 9.2-9 for the site-specific portions of the UHS Makeup Water system. CCNPP Unit 3 COLA FSAR Figure 9.2-3 is a conceptual figure to provide information on the interfaces of UHS Makeup Water system with Essential Service Water (ESW) system. The site-specific portion of the makeup system terminates at the ESW pump building. A test bypass line and isolation valve to be located in the ESW pump building are added as a departure to standard design as specified in response to Question 09.02.05-7 (Bullet No. 6).

The CCNPP Unit 3 COLA FSAR will be supplemented to add Subsections 9.2.5.7.1, 9.2.5.7.2, 9.2.5.7.3, Table 9.2-2 and update Figures 9.2-3 and 9.2-9.

NRC Question 09.02.05-7, (Bullet No. 4) [Valve Positions, Valves with Automatic Functions, Associated Design Features]:

CCNPP Unit 3 COLA FSAR Figure 9.2-3 is a conceptual figure to provide information on the interfaces of UHS Makeup Water system with the Essential Service Water (ESW) system. The piping and components outside the ESW pump building are part of the site-specific design. CCNPP Unit 3 COLA FSAR Figure 9.2-9 will be revised to show position indicators on the valves. The CCNPP Unit 3 COLA FSAR Figure 9.2-3 shows the open and closed position of the valves during a design basis accident. Position indicators for the valves that are inside ESW pump building are part of generic design shown in US EPR FSAR. CCNPP Unit 3 COLA FSAR Figure 9.2-3 will be revised to match the boundary of normal makeup and UHS Makeup with respect to U.S. EPR FSAR Figure 9.2.5-1. The design features of the UHS Makeup Water System will be updated as described in the response to Question 09.02.05-7 (Bullet No. 3).

The CCNPP Unit 3 COLA FSAR will be revised to update FSAR Figures 9.2-3 and 9.2-9.

NRC Question 09.02.05-7, (Bullet No. 5) [Label Safety related Components and MOVs in Figure 9.2-3]:

CCNPP Unit 3 COLA FSAR Figure 9.2-9 will be revised to reflect valve numbers and other safety-related site-specific components for the UHS Makeup Water system. Valve numbers and components numbers in the generic plant are shown in the US EPR FSAR Figure 9.2.1-1 and 9.2.5-1.

NRC Question 09.02.05-7, (Bullet No. 6) [Clarify Exact Locations of Safety Related Components]:

CCNPP Unit 3 COLA FSAR Figure 9.2-9 will be revised to show the location of various valves including the location of safety-related components. Site-specific safety-related MOVs are located inside Seismic Category I Structures. CCNPP Unit 3 COLA FSAR Figure 9.2-9 will be revised to show the building enclosure for the UHS Makeup Water traveling screen and the screen wash system. CCNPP Unit 3 COLA FSAR Figure 9.2-3 will be revised to show the test bypass isolation valve located inside the safety-related ESW pump building. The test bypass isolation piping and components are site-specific and located inside the ESW pump building.

A departure from the standard design is taken to provide full flow test capability for the UHS Makeup Water system. CCNPP Unit 3 COLA FSAR Section 1.8.2 will be revised to identify a departure from ESW system design piping configuration in the U.S. EPR FSAR Figure 9.2.5-1.

CCNPP Unit 3 COLA FSAR Section 1.8.2 and COLA Part 7 (Departures and Exemption Requests) Section 1.1 will be revised to reflect the new departure.

NRC Question 09.02.05-7, (Bullet No. 7) [Material for Above Ground and Buried Piping]:

The UHS Makeup Water system piping is normally in a state of dry layup. During post DBA scenario, the UHS Makeup Water system is exposed to brackish water from 72 hours through 30 days. Piping, valves and fittings are made of super austenitic steel. Additionally, the exterior surface exposed to the soil is cathodically protected.

CCNPP Unit 3 COLA FSAR Subsection 9.2.5.3.2 and FSAR Part 10, ITAAC Appendix B Table 2.4-22, "Ultimate Heat Sink Makeup Water System Inspections, Tests, Analysis and Acceptance Criteria," will be revised to reflect the material of above ground and buried piping.

NRC Question 09.02.05-7, (Bullet No. 8) [Identify Screen Wash System & Traveling Screen]:

CCNPP Unit 3 COLA FSAR Figure 9.2-3 and Figure 9.2-9 depict information on the screen wash system and traveling screens.

NRC Question 09.02.05-7, (Bullet No. 9) [Consistent Terminology for Alternate Blowdown Line]:

CCNPP Unit 3 COLA FSAR Figure 9.2-3 will be revised to show as "EMERGENCY BLOWDOWN" replacing the terminology "ALTERNATE BLOWDOWN" for the portion of piping inside ESW pump building.

CCNPP Unit 3 COLA FSAR will be revised to update Subsections 9.2.5.2.2 and 14.2.14.3.

NRC Question 09.02.05-7, (Bullet No. 10) [UHS Makeup versus Emergency Makeup]:

U.S. EPR FSAR uses the term "ESW Emergency Makeup Water system" for the system that provides post 72 hour makeup water under DBA scenario to the UHS cooling tower basin. As described in the U.S. EPR FSAR, ESW Emergency Makeup Water system terminates at the ESW building interface. CCNPP Unit 3 COLA FSAR uses the term "UHS Makeup Water system" for the system that provides the post 72 hour makeup, which includes safety-related piping and components outside the ESW building, the piping and components located in the UHS Makeup Water Intake Structure, the buried piping and components from UHS Makeup Water Intake structure up to ESW pump building and the test bypass piping and components that branches off from the ESW Emergency Makeup line and that connects to the normal blowdown line.

CCNPP Unit 3 COLA FSAR will be revised to clarify the description on Figure 9.2-3.

NRC Question 09.02.05-7, (Bullet No. 11) [Location of Blowdown Piping System and ESWS Pumps at the UHS Basin.]:

The conceptual CCNPP Unit 3 COLA FSAR Figure 9.2-3 provides an overview of the UHS Makeup Water system and its interface with the standard plant design. FSAR Figure 9.2-3 will be revised to reflect the appropriate level of detail.

NRC Question 09.02.05-7, (Bullet No. 12) [Discussion of ESWS Train 4 Support for Severe Accident]:

The dedicated Train 4 provides an independent means of cooling critical severe accident heat loads from the CCW heat exchanger by circulating ESW between the UHS and the Dedicated Train CCW components. As such the dedicated train is available immediately after at the start of a severe accident. Makeup water to the Train 4 UHS tower would not be necessary for well beyond 72 hours as the heat load during this event is low compared to a DBA. The desalination plant provides the required makeup water for the cooling tower and would also do so during the severe accident. In addition, the cooling tower makeup requirement is relatively low compared to the Design Basis Accident. Furthermore, the Train 4 safety-related UHS Makeup Water train is available and could be supplemented by other means if not available for the long-term to

support of severe accident. As noted in CCNPP Unit 3 COLA FSAR Subsection 9.2.1.3.2, no departures or supplements are included for the dedicated essential service water pumps. The dedicated Train 4 does not require dedicated equipment to provide UHS Makeup Water. Therefore no discussion is required for the support of severe accident in CCNPP Unit 3 COLA FSAR Section 9.2.5.

NRC Question 09.02.05-7, (Bullet No. 13) [Strainer MOVs in FSAR Figure 9.2-3]:

CCNPP Unit 3 COLA FSAR Figure 9.2-3 will be revised to depict the UHS Makeup Water pump strainer MOVs. The debris removal system (UHS Makeup Water Strainer) backwash arm operates similar to a valve operator, as such it is classified as a motor operated valve in Table 8.1-1 for the purpose of classification of electrical loads.

CCNPP Unit 3 COLA FSAR Table 8.1-1 through 8.1-4 is updated to include the Initial fill Isolation valve and UHS Makeup Water Traveling Screen Wash Pump Discharge Isolation valve.

NRC Question 09.02.05-7, (Bullet No. 14) [Description of ESW Basin Level Controller and Valve Types for Controls]:

During normal operation, the control of the UHS cooling tower basin level is part of the U.S. EPR FSAR. As stated in response to RAI 279, Question 09.02.05-10[1], at an established time prior to the required post 72 hour of the DBA, the UHS Makeup Water system is primed and ready for operation in response to a DBA. As low level in the cooling tower basin is reached in association with the existing Safety Injection System (SIS) signal, the ESW Emergency Makeup isolation valve is fully opened and the UHS makeup isolation valve is also fully opened to provide the required water to the UHS cooling tower basin. The normal makeup isolation valve that is closed at the receipt of the SIS signal will remain closed. As the cooling tower basin water level reaches the normal operation basin water level, UHS Makeup Water pump recirculation is opened automatically as necessary to prevent the over fill of the cooling tower basin. The cooling tower basin water level is then controlled in the same manner as during the normal operation. The ESW Emergency Makeup isolation butterfly valve is closed or opened automatically as required to maintain the water level in the basin post 72 hours of DBA. CCNPP Unit 3 COLA FSAR Subsection 9.2.5.3.2 will be revised to reflect this response.

NRC Question 09.02.05-7, (Bullet No. 15) [Discussion of ESW Makeup Pump Screens for Vertical Pump at the Suction]:

CCNPP Unit 3 COLA FSAR Subsections 9.2.5.2.3 and 9.2.5.3.2 provide information regarding traveling screens and bar screens that are installed in the UHS Makeup Water Intake Structure. There are no additional strainer/screens prior to the UHS Makeup pump, but as shown in Figure 9.2-9, there is a strainer at the pump discharge.

[1] UniStar Nuclear Energy Letter UN#11-197, 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. 279, Ultimate Heat Sink, dated June 30, 2011

NRC Question 09.02.05-7, (Bullet No. 16) [Clarification/Explanation of Basis on ESWS Cooling Tower Basin Blowdown Discharge Quantity to Retention Basin:

The FSAR text quoted in the question was changed in COLA FSAR Revision 7, Subsection 9.2.5.1 as below:

> "ESWS cooling tower blowdown discharges up to 61 gpm (231 lpm) of water to the retention basin to maintain ESWS chemistry. This quantity is based on maintaining ten cycles of concentration in the cooling tower basin."

The blowdown flow value is calculated using the formula:

Tower Blowdown Flow = (Cooling Tower Evaporation / (Cooling Tower Basin COC -1)) – Cooling Tower Drift

The cooling tower blowdown flow of 61 gpm with two trains in normal operation is obtained by substituting the following values in the above formula.

Cooling Tower Evaporation = 564 gpm (average for two trains, worst case 3 day evaporation in a year, 30 year period under normal operation)

Cooling Tower Drift = 2 gpm (for two trains, 0.005% of essential service water flow rate)

COC (Cycles of Concentration) = 10

NRC Question 09.02.05-7, (Bullet No. 17) [Logic Signal to Close on Accident signal for Sample MOV]:

CCNPP Unit 3 COLA FSAR Figure 9.2-9 depicts the UHS Makeup Water sample valve to be a manual valve. The manual UHS Makeup Water sample valve will be closed during normal operation and during design basis accidents. CCNPP Unit 3 COLA FSAR Figure 9.2-3 will be revised to reflect the sample valve as safety-related manual ball valve.

NRC Question 09.02.05-7, (Bullet No. 18) [Discussion on Freeze Protection/Heat Tracing in FSAR 9.2.5]:

The piping and components of UHS Makeup Water system that are inside the UHS Makeup Water pump room are climatically controlled by a safety-related ventilation system, as described in CCNPP Unit 3 COLA FSAR Section 9.4.15, to maintain a minimum temperature of 41°F, which provides the necessary freeze protection for systems and equipment within the pump room. The buried piping and components of the UHS Makeup Water system are located below the frost depth, which precludes freezing of the fluids and hence freeze protection is not required for piping outside the Seismic Category I structure. Any open drains are continuously sloped downward, so that the water cannot pool and freeze.

CCNPP Unit 3 COLA FSAR Subsection 2.4.7.7 addresses the freeze protection for non safety-related traveling screens and the screen wash system.

NRC RAI 90, Question 14.02-34[2] response, provides additional information on freeze protection for safety-related systems.

NRC Question 09.02.05-7, (Bullet No. 19) [Discussion on Flooding Consequences of Non-Safety Related Piping System]:

The impact of the failure of non safety-related piping is described in the responses to RAI 279, Question 09.02.05-06[1] and U.S. EPR RAI 351, Question 09.02.05-22[3].

NRC Question 09.02.05-7, (Bullet No. 20) [Description of Chemical Addition Pipe System Installation Related to Seismic Supports and Effects on UHS Makeup Pumps during Seismic Events]:

Due to dry layup of the system, permanent continuous chemical treatment is not required for the UHS Makeup Water system. The chemical addition for UHS Makeup Water system is done only during full flow testing, utilizing portable chemical skids and totes. CCNPP Unit 3 COLA FSAR Figure 9.2-3 will be revised to delete the chemical treatment system. CCNPP Unit 3 COLA FSAR Subsection 9.2.5.1, 9.2.5.2.4, 9.2.5.4.1, 9.2.5.5, and 9.2.5.6 will be revised to reflect this response.

COLA Impact

FSAR Subsection 1.8.2, "Departures" will be revised as follows:

1.8.2 Departures

...

{The list of departures from the U.S. EPR FSAR is as follows:

Maximum Differential Settlement (across the basemat)	FSAR 2.5.4 and 3.8.5
Maximum Annual Average Atmospheric Dispersion Factor (0.5 mile - limiting sector)	FSAR 2.3.5
Accident Atmospheric Dispersion Factor from (0 - 2 hour, Low Population Zone, 1.5 miles)	FSAR 2.3.4 and 15.0.3
In-Structure Response Spectra	FSAR 3.7.2.5.2
Toxic Gas Detection and Isolation	FSAR 3.11, 6.4, 9.4.1 and 14.2.12
Minimum Shear Wave Velocity	FSAR 2.5.4.2.5.8 and COLA Part 10, ITAAC Table 2.4-1
Maximum Non-Coincident Wet Bulb Temperature Value at 0% Exceedance (85°F)	FSAR 2.0, 2.3, and 9.2.1
Coefficient of Static Friction	FSAR 3.8.5.5

[2] UniStar Nuclear Energy Letter UN#09-231, 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. 90, Initial Plant Test Program, dated May 20, 2009

[3] Areva Response to U.S. EPR Design Certification Application RAI No. 351, FSAR Ch. 9, Supplement 6, dated November 4, 2010.

Generic Technical Specifications and Bases - Setpoint Control Program	FSAR 16 (COLA Part 4)
Test Bypass line (piping and valve) - UHS Makeup Water system	FSAR 9.2.5

Justification for these departures is presented in Part 7 of the COL application.}

...

FSAR Table 8.1-1, "Division 1 Emergency Diesel Generator Nominal Loads," Table 8.1-2, "Division 2 Emergency Diesel Generator Nominal Loads," Table 8.1-3, "Division 3 Emergency Diesel Generator Nominal Loads," and Table 8.1-4, "Division 4 Emergency Diesel Generator Nominal Loads" will be supplemented to add two rows as shown on Table 8.1-1 below (the same changes are also being made to Tables 8.1-2, 8.1-3, and 8.1-4):

Table 8.1-1 - {Division 1 Emergency Diesel Generator Nominal Loads}

Time Sequence (sec)	**Load Description**	**Volts**	**Rating (hp/ kW)**	**Operating Load LOOP (kW)**	**Operating Load DBA/LOOP (kW)**
Load Step Group 1 (Note 1)					
...					
15 (Note 3)	UHS Makeup Water Mini Flow Bypass MOV	480	2 hp	0	0
15 (Note 3)	UHS Makeup Water Initial Fill Isolation MOV	480	2 hp	0	0
15 (Note 3)	UHS Makeup Water Strainer MOVs (2 MOVs, 2 hp each)	480	4 hp	0	0
...					
Additional Manually Connected Loads					
...					
N/A	UHS Makeup Water Traveling Screen Wash Pump Motor	480	10 hp	0	0
N/A	UHS Makeup Water Traveling Screen Wash Pump Discharge Isolation Valve	480	2 hp	0	0
Total of Additional Manually Connected Loads				**0**	**0**

...

COLA FSAR Subsection 9.2.5.1 will be revised as described below:

9.2.5.1 Design Basis

...

The UHS Makeup pump provides up to 750 gpm (approximately 2,835 lpm) of water to each operating UHS cooling tower basin to replenish the UHS cooling tower basin losses due to evaporation, system leakages, and other losses, starting 72 hours post-accident.

~~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.~~Chemical treatment of UHS Makeup Water System during full flow testing is conducted using portable skids and totes as required.

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.

...

COLA FSAR Subsection 9.2.5.2.2 will be revised as described below:

9.2.5.2.2 Blowdown

...

The connection at the ESWS pump discharge is made through a safety-related MOV that closes automatically in the event of a DBA to ensure ESWS integrity.

An ~~alternate~~emergency blowdown path is provided from the same pump discharge connection through a second safety-related MOV in case the normal path is unavailable.

...

COLA FSAR Subsection 9.2.5.2.3 will be revised as described below:

9.2.5.2.3 UHS makeup Water System

...

There are four independent UHS Makeup Water System trains, one for each ESWS division. Each train has one vertical turbine type wet pit pump, a discharge check valve, a self-cleaning strainer, and a pump discharge isolation MOV (~~all~~ housed in four separate rooms at the UHS Makeup Water Intake Structure), plus the buried piping running up to and into the ESWS pumphouse at the ESWS cooling tower basin. The UHS Makeup Water System isolation MOV is located inside the ESWS pumphouse at the connection to the ESWS cooling tower basin.

In addition, each train has a surveillance test bypass that runs from just upstream of the isolation MOV at the ESWS cooling tower basin, through a safety-related ~~MOV~~valve, to the blowdown line upstream of the blowdown flow meter. The latter safety-related ~~MOV~~valve is normally closed, and will ~~ge~~remain closed ~~if open on receipt of an accident signal~~, providing assurance of UHS Makeup Water System integrity. Test bypass piping and valve is identified in Section 1.8.2, as a departure from the U.S. EPR FSAR.

COLA FSAR Subsection 9.2.5.2.4 will be revised as described below:

9.2.5.2.4 ESWS Makeup Water Chemical Treatment

~~The UHS Makeup Water System is normally in standby mode, and in dry layup condition. Specific chemistry requirements are defined to minimize corrosion, prevent scale formation, and limit biological and sedimentary fouling that could inhibit UHS Makeup Water flow. In addition,~~ tThere are chemical additives used in the ESWS cooling towers to reduce scaling and corrosion, and to treat potential biological contaminants, which are added via the normal ESWS piping. The ESW makeup chemical treatment system provides the chemistry control in both instances.

The treatment system consists of multiple skid-mounted arrangements, one for each division's ESWS cooling tower ~~and at least one for the UHS Makeup Water Intake Structure to service each UHS Makeup Water System division's train~~. Each skid contains the equipment, instrumentation and controls to fulfill the system's function of both monitoring and adjusting water chemistry. ~~The root valves at the connections of chemical addition and sample lines to the UHS Makeup Water System or normal ESWS piping are safety-related as necessary to ensure the integrity of UHS Makeup Water System piping during and following a DBA.~~

...

COLA FSAR Subsection 9.2.5.3.2 will be revised as described below:

9.2.5.3.2 Piping, Valves, and Fittings

...

UHS Makeup Water System Isolation Valves

...

Leakage rates for boundary isolation valves are based on ASME OM Code 2004 Edition, Subsection ISTC. The design of the UHS Makeup Water System pump capacity considers the expected valve seat leakage for the boundary isolation valves. Since UHS Makeup pump capacity has significant margin, boundary valve leakage rates are inconsequential.

For operating trains, the following describes the operation of key systems valves:

The UHS Makeup Water pump discharge isolation valve, 30PED10/20/30/40 AA001, is normally closed. Upon the receipt of an SI signal, the UHS Makeup Water pump discharge isolation valve remains closed. To mitigate the effect of water hammer during startup, the ESWS emergency makeup water isolation valve is closed and the UHS Makeup Water System pumps are manually started against a closed motor operated UHS Makeup Water pump discharge isolation valve. The pump discharge isolation valve will be opened and controlled automatically to slowly fill the UHS Makeup Water System piping with Chesapeake Bay water. Once the system is full, the pump discharge isolation valve and ESWS emergency isolation valve are completely opened to maintain the UHS tower basin level within the established operating limits.

The UHS Makeup Water pump minimum flow recirculation valve, 30PED10/20/30/40 AA002, is normally shut during normal operations. Prior to initial fill of the system, pump minimum flow recirculation valve is opened and controlled automatically to maintain the required pump flow, when the system is slowly being filled. Following an SI signal coincident with a low UHS basin

water level and once the UHS Makeup Water system piping is full, the pump minimum flow recirculation valve is closed and the UHS Makeup Water pump discharge valve is opened fully to provide makeup water to the UHS tower basin. The UHS Makeup pump minimum flow recirculation valve is opened, once the UHS tower basin is filled to operating level and the ESW Emergency Makeup discharge isolation valve is closed, to provide minimum required flow for continuous UHS Makeup Water pump operation. The pump minimum flow recirculation valve is closed in conjunction with the opening of ESW Emergency Makeup water isolation valve to provide the necessary flow to the UHS cooling tower basin.

The UHS Makeup Water pump discharge strainer blowdown isolation valve, 30PED10/20/30/40 AA006, is cycled open and shut automatically as necessary during UHS Makeup Water System pump operation to provide a flow path for debris removal from the pump discharge strainer during the automatic backwash cycle. The pressure relief backwash process of the filter is initiated by either the signal of differential pressure measuring system, a timer, after the start of the UHS Makeup Water pump, or via manual operator initiation. The pump discharge strainer blowdown isolation valve opens and the drive motor is energized. Upon receipt of an SI signal, the UHS Makeup Water pump discharge strainer blowdown isolation valve will automatically receive a signal to close.

The initial fill motor operated isolation valve, 30PED10/20/30/40 AA004, is closed during normal operation. Upon the receipt of an SI signal, this valve remains closed.

The manual UHS Makeup Water System test bypass isolation valve, 30PED10/20/30/40 AA023 is closed during normal operation and remains closed for post accident operation.

...

UHS Makeup Water System Piping

The UHS Makeup Water System piping and fittings that perform safety functions are designed to ASME Section III, Class 3 requirements, including normal operation and anticipated transient conditions. They are constructed of materials compatible with the brackish UHS makeup water.

Pipe diameters for branches of the UHS Makeup Water System are based on limiting the flow velocity to 10 ft/sec for normal modes of operation (during DBA). Pipe diameters for normal makeup and blowdown lines are also based on limiting the flow velocity to 10 ft/sec for normal operation, shutdown/cooldown conditions and Design Basis Accident conditions.

The UHS Makeup Water System piping is normally in a state of dry layup. During post DBA scenario, the UHS Makeup Water system is exposed to brackish water from 72 hours out through 30 days. Piping, valves and fittings are made of super austenitic steel. Additionally, the exterior surface exposed to the soil is cathodically protected.

...

Chemical Treatment System Components

...

Control Valves - These are needle valves that can be adjusted for precise control of the rate of chemical addition.

Sample Valves/Lines - There are several sample points located at representative points in the normal and ~~emergency~~UHS makeup piping for confirmatory sampling of makeup water chemistry.

...

COLA FSAR Subsection 9.2.5.4.1 will be revised as described below:

9.2.5.4.1 Normal Operating Conditions

...

The UHS Makeup Water System for each division is in standby, with the UHS Makeup Water System isolation MOV at the ESWS cooling tower basin closed and the pump isolation MOV closed. The bypass line's MOV is also closed.

Periodic surveillance testing is conducted to demonstrate UHS Makeup Water System operability~~, and includes addition of chemicals as necessary to maintain its water chemistry within the prescribed limits~~.

COLA FSAR Subsection 9.2.5.5 will be revised as described below:

9.2.5.5 Safety Evaluation

...

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

- Is designed, procured, constructed and operated in accordance with the criteria forASME 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.

...

COLA FSAR Subsection 9.2.5.6 will be revised as described below:

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.

COLA FSAR Subsection 9.2.5.7 will be revised as described below:

9.2.5.7 Instrumentation Applications

...

System performance can also be assessed using level indication on the cooling tower basins.}

9.2.5.7.1 System Monitoring

The UHS Makeup Water System is monitored for the following parameters.

- Traveling screen differential level
- Fluid flow rate and pressure downstream of the UHS Makeup Water pumps
- Differential pressure at the UHS Makeup Water pump discharge strainer
- Bearing Temperature of the UHS Makeup Water pump
- MOV position status
- UHS Makeup Water pump operating status (energized/de-energized)

9.2.5.7.2 System Alarms

- High differential level across traveling screen
- High pressure at UHS Makeup Water pump discharge
- Low pressure at UHS Makeup Water pump discharge
- Low flow at UHS Makeup Water pump discharge
- High differential pressure across the pump discharge strainer
- High bearing temperature of UHS Makeup Water pump

9.2.5.7.3 UHS Makeup Water System Safety Related I&C Functions

Upon the receipt of a safety injection signal, the following valves will receive a signal to automatically align to their post accident position as indicated.

- UHS Makeup Water pump discharge strainer blowdown isolation valve (closed)
- UHS Makeup Water pump initial fill isolation valve (closed)
- UHS Makeup Water pump discharge isolation valve (closed)
- UHS Makeup Water pump recirculation valve (closed)

In the event following an SIS signal the following manual actions for system filling take place:

9.2.5.7.3.1 Manual Actuation for system filling

Upon the receipt of a safety injection signal and at established time prior to 72 hours, the following actions are performed manually.

- The ESW Emergency Makeup isolation discharge valves are closed.
- The UHS Makeup Water pumps are started

The following actions take place automatically after the start of the UHS Makeup Water pump

- The UHS Makeup Water pump re-circulation valves are opened
- The UHS Makeup Water pump discharge isolation valves are opened to pre-determined position to fill the pipe
- When the line is filled, ESW Emergency Makeup isolation discharge valve is opened
- The UHS Makeup Water pump discharge valve is fully opened
- The UHS Makeup Water pump recirculation valve is closed

9.2.5.7.3.2 UHS Makeup Actuation from SIS Coincident with Low Water Level in the Cooling Tower Basin.

In the event of no manual action for system priming, following an SIS signal and coincident low water level, the following actions take place automatically.

- The ESW Emergency Makeup isolation discharge valve is closed
- The UHS Makeup Water pumps are started
- The UHS Makeup Water pump re-circulation valves are opened
- The UHS Makeup Water pump discharge isolation valves are opened to pre-determined position to fill the pipe
- When the line is filled, ESW Emergency Makeup isolation discharge valve is opened
- The UHS Makeup Water pump discharge valve is fully opened

The following valves are automatically re-aligned in response to a pump start/stop

- UHS Makeup Water pump discharge isolation valves (Open/Closed)
- UHS Makeup Water pump re-circulation valves (Open/Closed)
- ESW Emergency Makeup isolation valve (Open/Closed)}

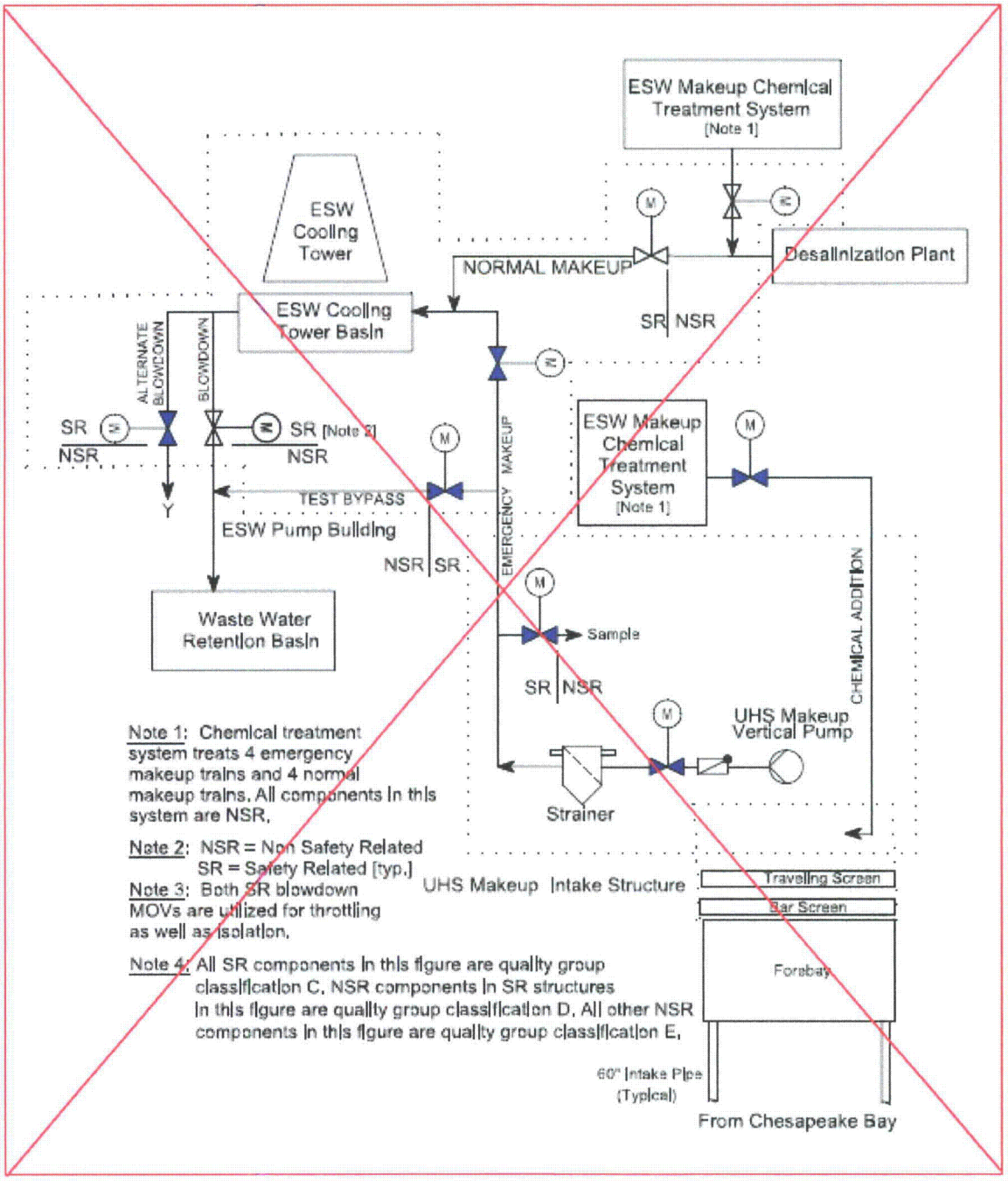
FSAR Table 9.2-1, "Design Parameters UHS Makeup Water System" and Table 9.2-2, "UHS Makeup Water System Alarm Summary" are being added as follows:

Table 9.2-1 – Design Parameters UHS Makeup Water System

Temperature (° F)	**Flow Rate (gpm)**		**Design Pressure (psig)**	**Comments**
Max	Min	Max	170	Design parameters during Post DBA.
100	300	750		

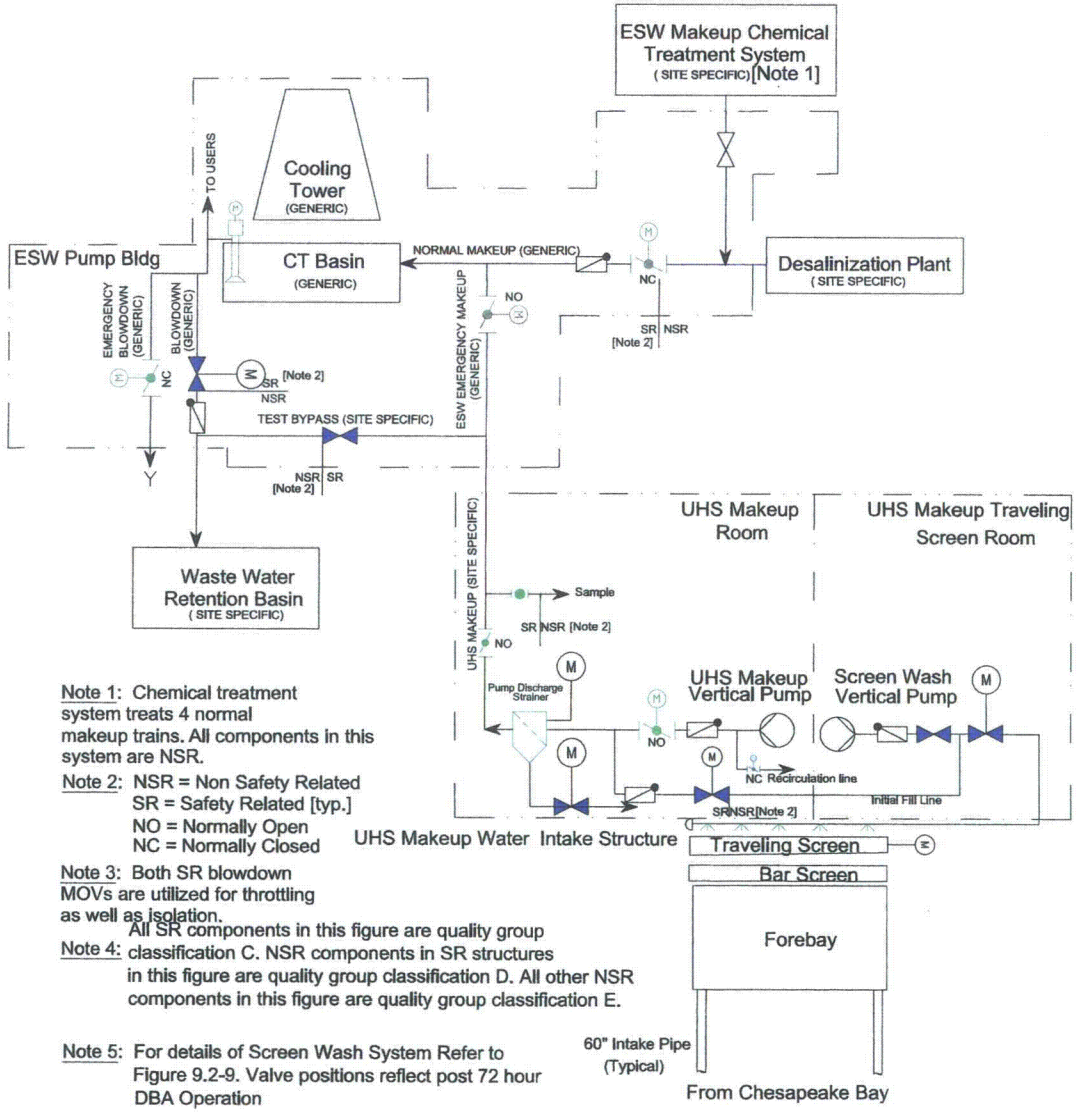
Table 9.2-2 UHS Makeup Water System Alarm Summary			
MCR/RSS Display	**Division**	**Setpoint Name**	**Function**
UHS Makeup Water Traveling Screen Differential Level	1/2/3/4	Max 1 Max 2 Max 3 Max 4 Max 5	Max 1: Traveling screen wash pump start and Traveling Screen Start Max 2: Traveling screen high speed Max 3: Alarm (Alerts the operator of Traveling Screen Blockage) Max 4: Alarm (Alerts the operator to manually clean the traveling screen) Max 5: UHS Makeup Water Pump Trip
UHS Makeup Water Pump Discharge Flow	1/2/3/4	Min 1 Min 2	Min 1: Alarm (Pump discharge Flow Low) Min 2: Alarm (Pump discharge Flow Low-Low) and Pump Trip
UHS Makeup Water pump discharge pressure Hi / Lo	1/2/3/4	Max 2 Max 1 Min 1 Min 2	Max 2: Alarm and Pump Trip Max 1: Alarm Min 1: Alarm (if Pump is Running) Min2: Alarm and initiates Train Switchover Sequence (if Pump is Running)
UHS Makeup Water pump discharge strainer differential pressure Hi	1/2/3/4	Max 4 Max 3 Max 2 Max 1	Max 4: Alarm and Pump Trip Max 3: Alarm Max 2: Auto-Start Strainer Motor Max 1: Status display in MCR
UHS Makeup Water pump abnormal (bearing temperature Hi)	1/2/3/4	Max 2 Max 1	Max 2: Alarm and Pump Trip Max 1: Alarm

FSAR Figure 9.2-3, "{Normal Makeup, Emergency Makeup, Blowdown & Chemical Treatment}" is being revised as follows:



The revised COLA FSAR Figure 9.2-3 is as follows:

Figure 9.2-3— {Normal Makeup, Emergency Makeup, Blowdown & Chemical Treatment}
(Typical for each of 4 independent trains)



Note 1: Chemical treatment system treats 4 normal makeup trains. All components in this system are NSR.

Note 2: NSR = Non Safety Related
SR = Safety Related [typ.]
NO = Normally Open
NC = Normally Closed

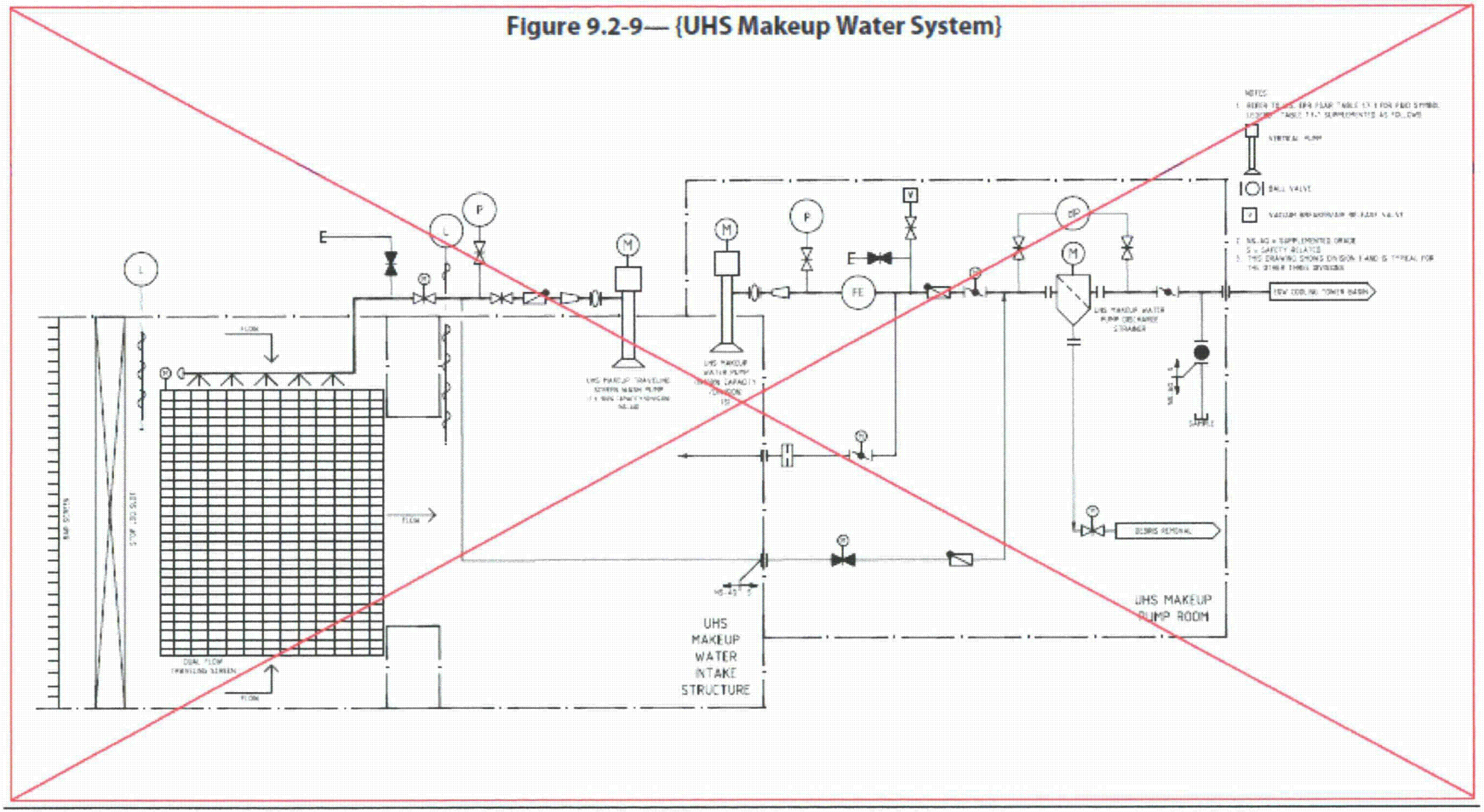
Note 3: Both SR blowdown MOVs are utilized for throttling as well as isolation.

Note 4: All SR components in this figure are quality group classification C. NSR components in SR structures in this figure are quality group classification D. All other NSR components in this figure are quality group classification E.

Note 5: For details of Screen Wash System Refer to Figure 9.2-9. Valve positions reflect post 72 hour DBA Operation

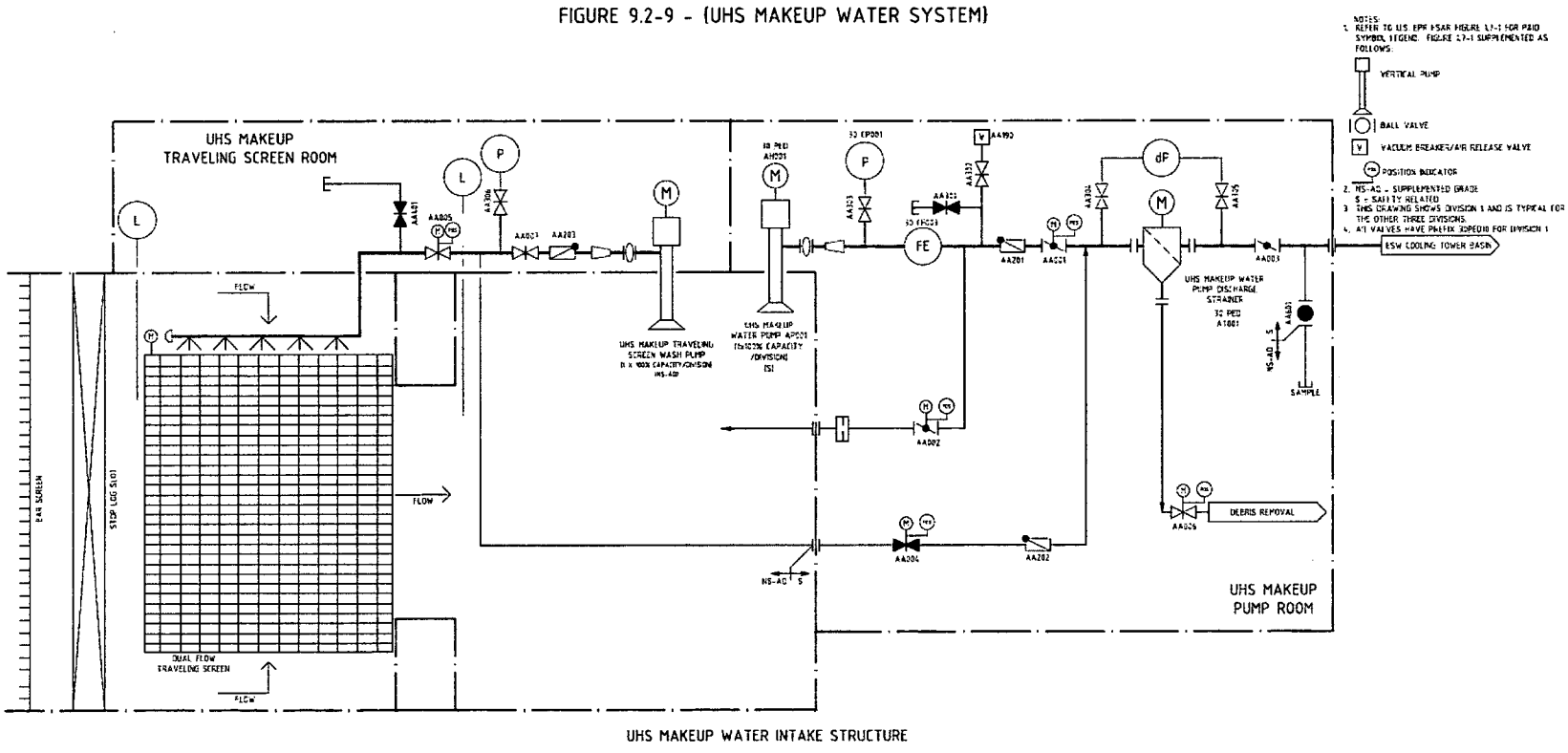
FSAR Figure 9.2-9, "{UHS Makeup Water System}" is being revised as follows:

Figure 9.2-9— {UHS Makeup Water System}



The revised COLA FSAR Figure 9.2-9 is as follows:

Figure 9.2-9— {UHS Makeup Water System}



COLA FSAR Subsection 14.2.14.3 will be revised as described below:

14.2.14.3 Essential Service Water Blowdown System

1. OBJECTIVES

   a. To demonstrate the ability of the essential service water (ESW) blowdown system, including the ~~alternate~~emergency blowdown path, to provide blowdown flow for control ofESW chemistry as designed.

...

COLA Part 7 Departures and Exemption Requests Section 1.1 will be revised as follows:

1.1 DEPARTURES

...

9. Generic Technical Specifications and Bases - Setpoint Control Program

10. Test bypass line – UHS Makeup Water system

A new COLA Part 7 Departures and Exemption Requests Section 1.1.10 will be added as follows:

1.1.10 Test Bypass Valve and piping for ESW Emergency Makeup piping design

Affected U.S. EPR FSAR Sections: Tier 2 Figure 9.2.5-1

Summary of Departure:

The U.S. EPR FSAR Figure 9.2.5-1 does not contain a provision to conduct full flow testing of UHS Makeup Water System, without transferring brackish water into the cooling tower basin. A test bypass line was added to the ESW Emergency Makeup Water System standard design to conduct full flow testing of the UHS Makeup Water System. Therefore, the U.S EPR ESW system is modified to enable surveillance testing requirements.

Scope/Extent of Departure:

This Departure is identified in the CCNPP Unit 3 FSAR Section 1.8.2, 9.2.5.2.3 and Figure 9.2-3.

Departure Justification:

The CCNPP Unit 3 site-specific UHS Makeup Water System provides Chesapeake Bay brackish water to the UHS tower basin no later than 72 hours after a DBA. The US EPR FSAR requires the COLA applicant to perform surveillance testing to ensure that UHS makeup water system can provide adequate flow to the UHS tower basin during post DBA. To ensure that makeup water can be provided to the UHS tower basin post-DBA,

flow testing is performed every two years on UHS Makeup Water System. Thus, to not contaminate the UHS cooling tower basin during full flow testing with Chesapeake Bay water, a test bypass line is provided to divert the brackish water from the ESW Emergency Makeup System from entering the UHS tower basin. A safety-related test bypass line manual isolation valve is provided, and is closed after testing to maintain the pressure boundary of the UHS Makeup Water System.

Departure Evaluation:

The UHS Makeup Water System maintains the pressure boundary through the safety-related test bypass manual isolation valve.

Therefore this Departure does not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific FSAR;

2. Result in more than a minimal increase in the likelihood of occurrence of malfunction of a structure, system, or component (SSC) important to safety and previously evaluated in the plant-specific FSAR;

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific FSAR;

4. Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the plant-specific FSAR;

5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific FSAR;

6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific FSAR;

7. Result in a design basis limit for a fission product barrier as described in the plant-specific FSAR being exceeded or altered; or

8. Result in a departure from a method of evaluation described in the plant-specific FSAR used in establishing the design bases or in the safety analyses.

This Departure does not affect resolution of a severe accident issue identified in the plant-specific FSAR.

Therefore, this Departure has no safety significance.

COLA Part 10 ITAAC Table 2.4-22 will be revised as follows (only the impacted portions are shown):

Table 2.4-22—{Ultimate Heat Sink Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
...			
13	The materials utilized in the equipment and piping of the UHS Makeup Water System are compatible with its as-built environmental conditions and brackish water.	a. An analysis of the materials utilized in the as-built equipment and piping will be performed. b. An inspection of the as-built piping will be conducted.	a. A report exists and concludes that the materials utilized in the equipment and piping installed in the UHS Makeup Water System ~~that is in contact with the water~~ is compatible with its as-built environmental conditions and brackish water. b. The as-built above ground and buried piping for the UHS Makeup Water System is composed of ~~either carbon steel SA-106 Grade B with a rubber liner, or ASME SB-675 stainless steel~~super austenitic steel.
...			