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UniStar
NUCLEAR ENERGY

10 CFR 50.4
10 CFR 52.79

March 31, 2010

UN#10-071

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. 118, Structural and Systems Engineering – Inspections, Tests, Analyses, and Acceptance Criteria

References:
1) John Rycyna (NRC) to Robert Poche (UniStar Nuclear Energy), " RAI No 118 SEB 2198.doc (Public)" email dated May 15, 2009

2) UniStar Nuclear Energy Letter UN#09-496, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 118, Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC), dated December 04, 2009

3) UniStar Nuclear Energy Letter UN#10-017, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 118, Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC), dated January 29, 2010

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 May 15, 2009 (Reference 1). This RAI addresses Structural and Systems Engineering - Inspections, Tests, Analyses, and Acceptance Criteria, as discussed in Appendix B of the Inspections, Tests,

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Analyses, and Acceptance Criteria (ITAAC), as submitted in Part 10 of the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 Combined License Application (COLA), Revision 6.

Reference 2 indicated that the response to Question 14.03.02-2, Items A, B, E, G, H, K, and O would be provided by March 31, 2010.

Reference 3 indicated that the response to Question 14.03.02-2, Item F would be provided by March 31, 2010.

The enclosure provides our response to RAI No. 118, Question 14.03.02-2, Items A, B, F, portions of G unrelated to waterproofing membrane, and Item O, 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 responses to RAI No. 118, Question 14.03.02-2, Items E, H and K, and Item G, Questions 2.b, 3, and 4 as they relate to waterproofing membranes. Responses to Items E, H, and K will be provided to the NRC by June 18, 2010. Responses to Item G, Questions 2.b, 3, and 4 as they relate to waterproofing membranes will be provided by June 30, 2010.

Our response 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. Wayne Massie at (410) 470-5503.

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

Executed on March 31, 2010

Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI No. 118, Question 14.03.02-2 Items A, B, F, G (Partial), and O, Structural and Systems Engineering - Inspections, Tests, Analyses, and Acceptance Criteria, 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)
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. 118, Question 14.03.02-2 Items A, B, F, G (Partial), and O,
Structural and Systems Engineering - Inspections, Tests, Analyses, and Acceptance Criteria,
Calvert Cliffs Nuclear Power Plant, Unit 3

RAI No. 118

Question 14.03.02-2 Item A

The staff has conducted its preliminary assessment of Calvert Cliffs Unit 3 FSAR Section 14.3.2, using the acceptance criteria and guidance provided in SRP 14.3.2 and RG 1.206 C.II.1.2.2. As needed, the staff also reviewed Section 14.3.2 of the EPR FSAR. Based on its preliminary assessment, the staff determined that additional information and clarification will be needed before it can determine whether FSAR Section 14.3.2 sufficiently meets the expectations of SRP 14.3.2 and RG 1.206 C.II.1.2.2. Therefore, the staff requests the applicant to address the following:

1. SRP 14.3.2 is entitled "Structural and Systems Engineering – Inspections, Tests, Analyses, and Acceptance Criteria". CCNPP3 FSAR 14.3.2 and EPR FSAR 14.3.2 are entitled "Tier 1, Chapter 2, System Based Design Descriptions and ITAAC. Please confirm that the scope of CCNPP3 FSAR/ EPR FSAR 14.3.2 is consistent with and addresses the scope of SRP 14.3.2. If this is not the case, please explain the differences and, as applicable, identify where in the CCNPP3 FSAR/ EPR FSAR other information pertinent to SRP 14.3.2 can be found.

2. Please explain the process used to identify the eight (8) specific items listed in FSAR Table 14.3-1. If there is information in EPR FSAR 14.3.2 that is used as input to this process, please identify it.

3. Please explain the process used to identify the Site-Specific Structures, Systems and Components listed in FSAR Table 14.3-2. If there is information in EPR FSAR 14.3.2 that is used as input to this process, please identify it.

4. In FSAR Table 14.3-2, there are a number of "No" entries in the "U.S. EPR Interface" column. Please explain the significance of these entries.

5. In FSAR Table 14.3-2, there are a number of "No" entries in the "Selected for ITAAC" column. These always align with a "No" entry in the "U.S. EPR Interface" column. Please explain the significance of these entries.

6. In FSAR Table 14.3-2, there are a number of "Yes" entries in the "Selected for ITAAC" column that align with a "No" entry in the "U.S. EPR Interface" column. Please explain the significance of these entries.

7. The staff compared the entries in FSAR Table 14.3-3 to EPR FSAR Tier 1 Section 4 - "Interface Requirements", and concluded that the EPR interface requirements have been properly identified in FSAR Table 14.3-3. The staff notes that for eight (8) of the interface requirements, no ITAAC is selected for CCNPP3, apparently on the basis that the design information provided in the CCNPP3 FSAR satisfies the interface requirement. Please confirm this, and provide a justification why the information in the FSAR is sufficient. Otherwise, please explain the basis for not selecting an ITAAC.

8. The staff notes that there are ITAAC identified in FSAR Part 10 Appendix B related to all eight (8) of the FSAR Table 14.3-3 entries discussed in (7) above. Please explain the significance of these ITAAC, if any, in satisfying the corresponding interface requirements identified in FSAR Table 14.3-3.

RESPONSE:

1. The title of FSAR Section 14.3.2 is being changed to be consistent with SRP 14.3.2, and is consistent with and addresses the scope of SRP 14.3.2.
2. An ITAAC Expert Panel was convened to identify the site-specific safety-significant features, based on a review of the site specific analyses. The ITAAC Expert Panel was comprised of a multi-discipline team that reviewed the site-specific analyses. This process was consistent with the process defined in U.S. EPR FSAR 14.3.2, and utilized some of the same members that developed the U.S. EPR ITAAC. Typically, a U.S. EPR subject matter expert or a UniStar Nuclear Energy representative familiar with a vendor specific analysis would present a summary of the analysis, and provide recommendations regarding what features should be considered safety significant. The members of the ITAAC Expert Panel would then discuss the analyses, and define the safety-significant features. The site-specific safety-significant features identified by the panel were incorporated into FSAR Table 14.3-1. The ITAAC Expert Panel reviewed each of the site-specific analyses presented in the FSAR. These included Safety Analyses, Radiological Analyses, Fire Analyses, Flooding Analyses, Anticipated Transient Without Scram (ATWS), Probabilistic Risk Assessment (PRA), and Severe Accident Analyses.
3. The selection criteria and methodology defined in the U.S. EPR FSAR, Section 14.3.2 were utilized to define the site-specific features to be addressed by Site Specific ITAAC. FSAR Table 14.3-2 was developed by reviewing the CCNPP Unit 3 COLA to identify the site specific structures, systems, and components that met the criteria for inclusion in the ITAAC. The selection criteria for inclusion in the ITAAC were: 1) Selection by the ITAAC Expert Panel; 2) Identification as safety-related (S) or non-safety-related Supplemental Grade (NS-AQ) FSAR Table 3.2-1; 3) Identification as being required for the Interfacing Requirement defined in the U.S. EPR FSAR; 4) Emergency Planning; and 5) Security.
4. The FSAR Table 14.3-2 U.S. EPR Interface entries for the Site-Specific Structure, System or Component (SSC) line items represent whether the U.S. EPR Design Certification (DC) specifically defined "interface" requirements regarding that particular system. These interface requirements are identified in FSAR Table 14.3-3. The "No" entries simply define that those structures, systems, or components are not associated with any of the interfacing requirements denoted in FSAR Table 14.3-3.
5. As stated in the response to #2 above, the criteria for selecting SSCs that required ITAAC were: 1) selection by the Expert Panel; 2) Identification as safety-related (S) or non-safety-related Supplemental Grade (NS-AQ) FSAR Table 3.2-1; 3) Identification as being required for the Interfacing Requirement defined in the U.S. EPR FSAR; 4) Emergency Planning; and 5) Security. If the SSCs did not meet any of those requirements, then the "Selected for ITAAC" column was marked "No." Those marked "No" in the "Selected for ITAAC" will also have a "No" in the "U.S. EPR Interface" requirement.
6. As stated in #2 and #5 above, the criteria for selecting SSCs that required ITAAC were: 1) selection by the Expert Panel; 2) Identification as safety-related (S) or non-safety-related Supplemental Grade (NS-AQ) FSAR Table 3.2-1; 3) Identification as being required for the Interfacing Requirement defined in the U.S. EPR FSAR; 4) Emergency Planning; and 5) Security. Thus, a SSC may not be associated with an "U.S. EPR Interface" requirement listed in FSAR Table 14.3-3, but ITAAC may be required to address one of the other criteria.
7. Several of the interface requirements specified in the U.S. EPR FSAR are associated with the design criteria for a SSC. If ITAAC were provided for these items, they would

take the form of design acceptance criteria (DAC). Instead of providing (DAC) and delaying the NRC review of this information, the CCNPP Unit 3 COLA contains the specific design criteria associated with several of the interface requirements. As a result, no ITAAC were provided for those items, because the application provides adequate information for the NRC to establish the acceptability of the site-specific design to meet the U.S. EPR interface requirements.

8. ITAAC are provided to explicitly address the interfacing requirements identified as "Yes" in FSAR Table 14.3-3. For several SSCs, the only ITAAC provided is to address the U.S. EPR interface requirement.

COLA Impact

The COLA FSAR will not be revised as a result of this response.

RAI No. 118

Question 14.03.02-2 Item B

For three (3) interface requirements in Calvert Cliffs Unit 3 FSAR Table 14.3-3, related to new and spent fuel storage racks, the applicant indicates that no ITAAC is needed and states: "The design of the new and spent fuel storage racks is discussed in Section 9.1." FSAR Section 9.1 states that the design and analyses for the new and spent fuel storage racks will be incorporated in Revision 1 of the U.S. EPR FSAR. It further states that this revision will include the analyses in UniStar Topical Report UN-TR-08-001, "Spent and New Fuel Storage Analyses for U.S. EPR Topical Report", dated March 2008 (UniStar, 2008) and incorporate additional analyses to bind the site specific conditions at {CCNPP Unit 3}. Since EPR FSAR Rev 1 has not been submitted, the staff considers the applicant's determination that an ITAAC is not needed to be premature. Therefore, the staff requests the applicant to include the pertinent information in the Calvert Cliffs Unit 3 FSAR, or reconsider its determination that an ITAAC is not needed.

Response

The ITAAC for new and spent fuel storage racks were removed as part of the UniStar Nuclear Energy letter transmitting the COLA changes related to new and spent fuel storage racks[1].

COLA Impact

The COLA FSAR will not be revised as a result of this response.

[1] UniStar Nuclear Energy Letter UN#10-047, from Greg Gibson to Document Control Desk, U.S. NRC, New and Spent Fuel Storage Racks, dated February 26, 2010

RAI No. 118

Question 14.03.02-2 Item F

Calvert Cliffs Unit 3 COL Application, Part 10 – ITAAC, Appendix B Table 2.4-1 specifies Structural Fill and Backfill Under Seismic Category I and Seismic Category II-SSE Structures ITAAC. For this table, provide the following information:

1. Clarify if there are any Category II structures that utilize structural fill or backfill. If so, explain why these structures are not included in this table.

2. The table should reference figures that show the depth and plan area for all structural fill and backfill for all Seismic Category I, II, and II-SSE structures.

3. The specific tests to be performed under the second column (ITA) should be discussed or a reference should be provided to an FSAR section that describes the tests to be performed.

4. For Items 1, 2 and 3 under Acceptance Criteria, reference should be made to a report that describes the tests that have been performed and documents that the acceptance criteria have been met.

5. For item 4, explain why this item refers only to "backfill," while the other items refer to "structural fill and backfill." As applied to the Calvert Cliffs plant, explain the difference between the terms "backfill' and "structural backfill."

Response

NOTE: This response is based on the information in updated COLA Part 10 ITAAC Appendix B Table 2.4-1[2].

1. The Vent Stack is classified as a Seismic Category II structure for CCNPP Unit 3, and is supported on top of the Fuel Building. Therefore, the Vent Stack will not be supported on structural fill. Based on FSAR Section 3.7 (submitted via letter UN# 09-519), Circulating Water Makeup Intake Structure is classified as a Seismic Category II structure. The foundation basemat of this structure does not utilize the structural fill. Other Seismic Category II structures such as the Turbine Building, Switchgear Building, Nuclear Auxiliary Building, and Access Building will utilize structural fill (see FSAR Figures 2.5-160 thru 2.5-164[3]. Since the Category II structures are not safety-related, they are not included in COLA Part 10 ITAAC Appendix B Table 2.4-1.

2. FSAR Section 2.5.4.5.2 discusses the extent of excavations and backfills for CCNPP Unit 3. FSAR Figures 2.5-104, 2.5-105, 2.5-160 through 2.5-165, and 2.5-198 through 2.5-202[3] show various cross sections that identify the depth and lateral extent of structural fill (called out as "structural backfill" in these Figures) for Seismic Category I,

[2] UniStar Nuclear Energy Letter UN#10-027, from Greg Gibson to Document Control Desk, U.S. NRC, Shear Wave Velocity, dated January 29, 2010

[3] UniStar Nuclear Energy Letter UN#09-427, from Greg Gibson to Document Control Desk, U.S. NRC, Update to FSAR Sections 2.5.4 and 2.5.5, dated October 9, 2009

Seismic Category II and Seismic Category II-SSE structures. Direct references to the FSAR were not included in the ITAAC Table.

3. The tests associated with compaction and field measurements of shear wave velocities for the structural fill are described in FSAR Section 2.5.4.5.3. Direct references to the FSAR were not included in the ITAAC Table.

4. Reference to a report has been added that describes the tests that have been performed and documents that the acceptance criteria have been met.

5. For CCNPP Unit 3, the terms "structural fill", "structural backfill" and "backfill" are used interchangeably in FSAR Sections 2.5.4 and 2.5.5 to represent structural fill that is compacted to a density of at least 95% of Modified Proctor (as described in FSAR Section 2.5.4.5.3) for Seismic Category I and Seismic Category II-SSE structures. COLA Part 10 Appendix B ITAAC Table 2.4-1 has been updated to utilize the consistent term "structural fill".

COLA Impact

FSAR Section 2.5.4.5.3 is being updated as follows: (The base FSAR text includes the changes provided previously[4]):

2.5.4.5.3 Compaction Specifications

Testing of structural backfill is described in Section 2.5.4.2.4. For foundation support and backfill against walls, structural fill is compacted to minimum 95 percent of its maximum dry density, as determined based on the Modified Proctor compaction test procedure (ASTM, 2002). The fill is compacted to within 3 percent of its optimum moisture content.

Fill placement and compaction control procedures are addressed in a technical specification prepared during the detailed design stage of the project. It will include requirements for suitable fill, sufficient testing to address potential material and gradation variations, and in-place density and moisture content testing frequency, e.g., a minimum of one field density test per 10,000 square ft of fill placed.

Testing and analysis will be performed to confirm the structural fill shear wave velocity at the bottom of the basemats for Seismic Category I and Seismic Category II-SSE structures meets or exceeds the requirements in Table 2.4-1. The testing will consist of shear wave velocity (VS) measurements using Spectral Analysis of Surface Waves (SASW). The testing frequency will be selected to produce a VS profile with depth, at three locations per SASW line. The initial SASW testing will be performed at the foundation elevation along a line (either east-west or north-south) beneath the center line of each structure. A second line, parallel to the first line (and at the same elevation) will be carried out adjacent to each structure in areas free from foundations or other structures. The third and final SASW line will be performed at the final rough or finished grade elevations directly above the second line tested in the area free from foundations. The first and second lines of testing allow direct comparison of the fill quality and variability at the level of the foundation. The second and final testing allows assessment of the increase in VS

[4] UniStar Nuclear Energy Letter UN#09-427, from Greg Gibson to Document Control Desk, U.S. NRC, Update to FSAR Sections 2.5.4 and 2.5.5, dated October 9, 2009

with increasing confining pressure due to the backfill loading at the same vertical location. Given the consistency between the first and second SASW lines, conclusions can be drawn regarding the relationship between VS and confining pressure beneath the structure. The recorded VS measurements will also be compared with VS measurements from RCTS testing at comparable confining pressures, allowing correlation of design (laboratory-based) and actual (field-based) measurements.

In addition to SASW testing, a second geophysical method (e.g., down-hole testing) will be utilized to measure VS at one location at final rough or finished grade for each structure for redundancy and confirmation purposes. The NRC will be informed of critical dates for testing of structural fill so they may observe the testing process.

The backfill supplier will submit samples of backfill prior to placement to perform tests such as Modified Proctor, grain size and chemical properties. The number of samples should adequately cover each of the backfill supply batches. Samples should be collected in accordance with ASTM D75. Each sample should be representative of the material from a single source. Testing will be performed by an independent qualified laboratory.

Samples from each placement lift (usually 8 feet) will be extracted from the placed fill. Careful inspection and testing during fill placement will be enforced and sample collection will be prioritized and fill placement progress interrupted if required. The number of samples tests will be sufficient to adequately represent the area coverage of the backfill for each lift. The number of required collection samples and quality control testing will be indicated by the testing specification.

Once fill is placed, and prior to beginning of foundation work, the following in-situ tests will be performed to verify strength and dynamic properties:

- •Standard Penetration Tests, since the N value is extremely useful to correlate to other strength and dynamic properties.
- •In-Situ, conventional downhole test, to measure shear wave velocity as a function of depth. The downhole test is preferred to the PS-Logging since casing and grouting will be required to maintain the integrity of the hole.
- •In-Situ, surface wave shear wave velocity measurements.

RAI No. 118

Question 14.03.02-2 Item G

Calvert Cliffs Unit 3 COL Application, Part 10 – ITAAC, Appendix B Tables 2.4-2 through 2.4-6 provide ITAAC for the Nuclear Island Structures, Emergency Power Generating Building, Nuclear Auxiliary Building, Radioactive Waste Building and Essential Service Water Building.

1. As discussed in Appendix B Section 2.1, the design certification ITAAC for these structures are contained in the U.S. EPR FSAR Tier 1, which is incorporated by reference. The staff notes that there are a number of RAIs related to the ITAAC included in the U.S. EPR FSAR application that may result in the revision of the EPR ITAAC tables. Therefore, it is the staff's understanding that the applicant will also incorporate by reference any future changes to the design certification ITAAC. Also, it is the staff's understanding that the ITAAC in Tables 2.4-2 through 2.4-6 are considered supplemental site-specific ITAAC for these structures. Please confirm that the staff's understanding is correct.

2. For the site-specific ITAAC in Tables 2.4-2 through 2.4-6, provide the following information:

a. For Items 1 and 2, provide a reference to a report that will document that the acceptance criteria have been met.

b. For Item 1, describe or reference a section in the FSAR that describes the inspection procedure that will be used to provide assurance that the waterproofing membrane will cover the entire bottom surface and sides of the foundation mat and the below grade structural walls, including locations of intersecting vertical and horizontal seams. For all walls, specify the elevation of the top of the waterproofing membrane and the technical basis for this elevation. Also describe the inspection procedure that will be used to assure that no damage to the membrane has occurred during construction.

c. For item 2, describe or reference a section in the FSAR that describes the tests that will be conducted to ensure that the concrete meets specific parameters. Also describe the specific parameters that must be met.

3. Questions 2.a, 2.b, and 2.c above also apply to plant-specific ITAAC in Table 2.4-7 (Items 4 and 5), Table 2.4-8 (Items 2 and 3), Table 2.4-9 (Items 6 and 7), and Table 2.4-10 (Items 3 and 4).

4. Explain why Items 1 and 2 in ITAAC Table 2.4-2 are not also included in ITAAC Tables 2.4-11 through 2.4-20.

Response – Items 1, 2a, 2c

1. Future changes in the design certification ITAAC will be incorporated by reference. Additionally, ITAAC Tables 2.4-2 through 2.4-6 provide supplemental site-specific ITAAC for the Nuclear Island Structures, Emergency Power Generating Buildings, Nuclear Auxiliary Building, Radioactive Waste Building, Essential Service Water Buildings.
2. Tables 2.4-2 through 2.4-6:
    a. Provide reference to a report that documents that the acceptance criteria have been met. In addition the concrete ITAAC is clarified.

c. The concrete mix parameters for safety-related buildings listed in Item 2 of ITAAC Tables 2.4-2 through 2.4-6 conform to the codes listed in Table 1. Testing for compliance of design parameters are described in applicable ASTM standards that are invoked in the various U.S. EPR FSAR and COLA FSAR sections listed in Table 1.

Table 1: Summary of U.S. EPR FSAR & COLA FSAR Sections and Codes Defining Concrete Mix Parameters for Safety-Related Structures Listed in ITAAC Tables 2.4-2 to 2.4-6

ITAAC Table	Building Description	U.S. EPR FSAR & COLA FSAR Sections[C]	Codes
Table 2.4-2	Nuclear Island Common Basemat Structures		
	– Reactor Containment Building	Section 3.8.1.6.1	ASME BPVC Sect. III, Div. 2 (2004 Ed.)[A]
	– Reactor Building Internal Structures	Section 3.8.3.6.1	ACI 349-01[B]
	– Other Safety-Related Structures on Common Basemat	Section 3.8.4.6.1	ACI 349-01[B]
Table 2.4-3	Emergency Power Generating Buildings	Section 3.8.4.6.1	ACI 349-01[B]
Table 2.4-4	Nuclear Auxiliary Building	Section 3.8.4.6.1	ACI 349-01[B]
Table 2.4-5	Radioactive Waste Building	Section 3.8.4.6.1	ACI 349-01[B]
Table 2.4-6	Essential Service Water Buildings	Section 3.8.4.6.1	ACI 349-01[B]

Notes:
[A] Subarticle CC-2230 of ASME Boiler Pressure Vessel Code, Section III, Division 2
[B] Chapter 4 of ACI 349-01
[C] Parameters related to foundation requirements are listed in U.S. EPR FSAR Section 3.8.5.6.1

The parameters that must be met are: 1) the maximum water-to-cementitious materials (w/cm) ratio, and 2) the maximum limit on supplemental cementitious materials, such as fly ash, silica fume, etc.

3. Table 2.4-7 (Items 4 and 5), Table 2.4-8 (Items 2 and 3), Table 2.4-9 (Items 6 and 7), and Table 2.4-10 (Items 3 and 4) are being revised to:
    a. Provide a reference to a report that documents that the acceptance criteria have been met.
    c. Specify that the concrete mix for Ultimate Heat Sink Makeup Water Intake Structure (ITAAC Table 2.4-7 Item 5), Ultimate Heat Sink Electrical Building (ITAAC Table 2.4-8 Item 3), Buried Duct Banks and Pipes (ITAAC Table 2.4-9 Item 7), and Fire Protection Building (ITAAC Table 2.4-10 Item 4) conforms to ACI 349-01. Testing for compliance with design parameters are described in applicable ASTM standards listed in U.S. EPR FSAR Sections 3.8.4.6.1 and 3.8.5.6.1, and invoked in plant-specific FSAR Sections 3.8.4.6.1 and 3.8.5.6.1.
        i. The parameter verified by the ITAAC is the maximum water-to-cementitious materials (w/cm) ratio.

4. Tables 2.4-11 through 2.4-20
    a. Item 2 in ITAAC Table 2.4-2 provides requirements for increased durability of below-grade concrete against aggressive soil and groundwater. Concrete durability is achieved by using a dense concrete mix design that exhibits a low water/cementitious materials (w/cm) ratio coupled with a suitable blend of cementitious materials appropriate for the aggressive service environment. These concrete durability requirements apply to both safety-related and non-safety-related structures.
    b. Since the structures listed in ITAAC Tables 2.4-11 through 2.4-20 are not safety-related, Item 2 in ITAAC Table 2.4-2 was not included for these structures. However, as identified in U.S. EPR FSAR and COLA FSAR Section 3.7.2.8, the non-safety-related Turbine Building (ITAAC Table 2.4-11), Switchgear Building (ITAAC Table 2.4-12), and Circulating Water Makeup Intake Structure (ITAAC Table 2.4-19) have the potential to interact with safety-related structures under SSE loading conditions. Since these structures have higher safety significance,

concrete durability requirements identified in Item 2 of ITAAC Table 2.4-2 will be added to ITAAC Tables 2.4-11, 2.4-12 and 2.4-19, but will not be included in ITAAC Tables 2.4-13 through 2.4-18 and 2.4-20.

COLA Impact

COLA Part 10 Appendix B, Tables 2.4-2 through 2.4-12, and 2.4-19 will be updated as follows:

Table 2.4-2—{Nuclear Island Structures Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
1	For the Nuclear Island structures' below grade concrete foundation and walls, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	A report exists that concludes that for ~~For~~ the as-built Nuclear Island structures' below grade concrete foundation and walls, the as-installed waterproofing membrane eliminates direct contact of ground water chemicals.
2	For the Nuclear Island structures' below grade concrete foundation and walls, a low water to cement ratio concrete ~~and improved concrete~~ mixture ~~design~~ will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit. ~~specific parameters.~~	A report exists that concludes the ~~The~~ concrete utilized to construct the as-built Nuclear Island structures' below grade concrete foundation and walls ~~met the following: a. A~~ have a maximum water to cementitious materials ratio of 0.45. ~~b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.~~

Table 2.4-3—{Emergency Power Generating Buildings Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
1	For the Emergency Power Generating Buildings' below grade concrete foundations and walls, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	A report exists that concludes that for ~~For~~ the as-built Emergency Power Generating Buildings' below grade concrete foundation and walls, the as- installed waterproofing membrane eliminates direct contact of ground water chemicals.
2	For the Emergency Power Generating Buildings' below grade concrete foundations and walls, a low water to cement ratio concrete ~~and improved concrete~~ mixture ~~design~~ will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit. ~~specific parameters.~~	A report exists that concludes the ~~The~~ concrete utilized to construct the as-built Emergency Power Generating Buildings' below grade concrete foundation and walls ~~met the following: a. A~~ have a maximum water to cementitious materials ratio of 0.45. ~~b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.~~

Table 2.4-4—{Nuclear Auxiliary Building Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
1	For the Nuclear Auxiliary Building's below grade concrete foundation and walls, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	<u>A report exists that concludes that for</u> ~~For~~ the as-built Nuclear Auxiliary Building's below grade concrete foundation and walls, the as-installed waterproofing membrane eliminates direct contact of ground water chemicals.
2	For the Nuclear Auxiliary Building's below grade concrete foundation and walls, a low water to cement ratio concrete ~~and improved concrete~~ mixture ~~design~~ will be utilized.	Tests<u>, inspections, or a combination of tests and inspections</u> will be conducted to ensure the concrete meets <u>the low water to cement ratio limit.</u> ~~specific parameters.~~	<u>A report exists that concludes the</u> ~~The~~ concrete utilized to construct the as-built Nuclear Auxiliary Building's below grade concrete foundation and walls ~~met the following: a. A~~ <u>have a</u> maximum water to cementitious materials ratio of 0.45. ~~b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.~~

Table 2.4-5—{Radioactive Waste Building Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
1	For the Radioactive Waste Building's below grade concrete foundation and walls, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	A report exists that concludes that for ~~For~~ the as-built Radioactive Waste Building's below grade concrete foundation and walls, the as-installed waterproofing membrane eliminates direct contact of ground water chemicals.
2	For the Radioactive Waste Building's below grade concrete foundation and walls, a low water to cement ratio concrete ~~and improved concrete~~ mixture ~~design~~ will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit. ~~specific parameters.~~	A report exists that concludes the ~~The~~ concrete utilized to construct the as-built Radioactive Waste Building's below grade concrete foundation and walls ~~met the following: a. A~~ have a maximum water to cementitious materials ratio of 0.45. ~~b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.~~

Table 2.4-6—{Essential Service Water Buildings Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
1	For the Essential Service Water Buildings' below grade concrete foundations and walls, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	A report exists that concludes that for ~~For~~ the as-built Essential Service Water Buildings' below grade concrete foundation and walls, the as-installed waterproofing membrane eliminates direct contact of ground water chemicals.
2	For the Essential Service Water Buildings' below grade concrete foundations and walls, a low water to cement ratio concrete ~~and improved concrete~~ mixture ~~design~~ will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit. ~~specific parameters.~~	A report exists that concludes the ~~The~~ concrete utilized to construct the as-built Essential Service Water Buildings' below grade concrete foundation and walls ~~met the following: a. A~~ have a maximum water to cementitious materials ratio of 0.45. ~~b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.~~

Table 2.4-7—{Ultimate Heat Sink Makeup Water Intake Structure Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
4	For the UHS Makeup Water Intake Structure's below grade concrete foundation and walls, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	A report exists that concludes that for ~~For~~ the as-built UHS Makeup Water Intake Structure's below grade concrete foundation and walls, the as-installed waterproofing membrane eliminates direct contact of ground water chemicals.
5	For the UHS Makeup Water Intake Structure's below grade concrete foundation and walls, a low water to cement ratio concrete ~~and improved concrete~~ mixture ~~design~~ will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit. ~~specific parameters.~~	A report exists that concludes the ~~The~~ concrete utilized to construct the as-built UHS Makeup Water Intake Structure's below grade concrete foundation and walls ~~met the following:~~ ~~a. A~~ have a maximum water to cementitious materials ratio of 0.45. ~~b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.~~

Table 2.4-8—{Ultimate Heat Sink Electrical Building Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
2	For the UHS Electrical Building's below grade concrete foundation and walls, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	A report exists that concludes that for For the as-built UHS Electrical Building's below grade concrete foundation and walls, the waterproofing membrane eliminates direct contact of ground water chemicals.
3	For the UHS Electrical Building's below grade concrete foundation and walls, a low water to cement ratio concrete and improved concrete mixture design will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit. specific parameters.	A report exists that concludes the The concrete utilized to construct the as-built UHS Electrical Building's below grade concrete foundation and walls met the following: a. A have a maximum water to cementitious materials ratio of 0.45. b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.

Table 2.4-9—{Buried Duct Banks and Pipes Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
6	For the buried, Seismic Category I electrical conduit duct banks, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	A report exists that concludes that for For the as-built buried Seismic Category I electrical duct banks, the as-installed waterproofing membrane eliminates direct contact of ground water chemicals.
7	For the concrete components of buried Seismic Category I electrical duct banks and pipes, a low water to cement ratio concrete and improved concrete mixture design will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit. specific parameters.	A report exists that concludes the The concrete utilized to construct the concrete components of as-built buried Seismic Category I electrical duct banks and pipes met the following: a. A have a maximum water to cementitious materials ratio of 0.45. b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.

Table 2.4-10—{Fire Protection Building Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
3	For the Fire Protection Building's concrete foundation and walls exposed to ground water, a waterproofing membrane is utilized to eliminate direct contact of ground water chemicals.	An inspection of the as-built structure will be conducted.	A report exists that concludes that for ~~For~~ the as-built Fire Protection Building's below grade concrete foundation and walls, the as-installed waterproofing membrane eliminates direct contact of ground water chemicals.
4	For the Fire Protection Building's concrete foundation and walls exposed to ground water, a low water to cement ratio concrete ~~and improved concrete~~ mixture ~~design~~ will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit. ~~specific parameters.~~	A report exists that concludes the ~~The~~ concrete utilized to construct the as-built Fire Protection Building's below grade concrete foundation and walls ~~met the following: a. A~~ have a maximum water to cementitious materials ratio of 0.45. ~~b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.~~

Table 2.4-11—{Turbine Building Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
3	The Turbine Building houses the components of the steam condensate main feedwater cycle, including the turbine-generator.	An inspection of the as-built structure will be conducted.	The as-built Turbine Building houses the components of the steam condensate main feedwater cycle, including the turbine-generator, in accordance with the design.
4	For the Turbine Building's below grade concrete foundation and walls, a low water to cement ratio concrete mixture will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit.	A report exists that concludes the concrete utilized to construct the as-built Turbine Building's below grade concrete foundation and walls have a maximum water to cementitious materials ratio of 0.45.

Table 2.4-12—{Ultimate Heat Sink Makeup Water Intake Structure Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
4		b. An inspection of the as-built barriers, doors, dampers, and penetrations will be conducted.	b. The as-built configuration of fire barriers, doors, dampers, and penetrations that separate each SBO Diesel Generator and its supporting equipment from the other equipment in the as-built Switchgear Building or as-built Turbine Building conforms to the design.
5	For the Ultimate Heat Sink Makeup Water Intake Structure's below grade concrete foundation and walls, a low water to cement ratio concrete mixture will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit.	A report exists that concludes the concrete utilized to construct the as-built Ultimate Heat Sink Makeup Water Intake Structure's below grade concrete foundation and walls have a maximum water to cementitious materials ratio of 0.45.

Table 2.4-19—{Circulating Water Makeup Intake Structure Inspections, Tests, Analyses, and Acceptance Criteria}

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
1	The Circulating Water Makeup Intake Structure will not impact the ability of any safety-related structure, system, or component to perform its safety function following a seismic event.	An inspection and/or analysis of the as-built structure will be conducted.	A report exists and concludes that under seismic loads the as-built Circulating Water Makeup Intake Structure will not impact the ability of any safety-related structure, system or component to perform its safety function. The report confirms that the: · As-built reinforced concrete embedded structure of the Circulating Water Makeup Intake Structure is designed to the same requirements as a Seismic Category I structure, thus meeting Acceptance Criteria 8.C of SRP 3.7.2. · Collapse of above-grade steel superstructure does not impair the integrity of Seismic Category I structures, systems or components, nor result in incapacitating injury to control room occupants.
2	For the Circulating Water Makeup Intake Structure's below grade concrete foundation and walls, a low water to cement ratio concrete mixture will be utilized.	Tests, inspections, or a combination of tests and inspections will be conducted to ensure the concrete meets the low water to cement ratio limit.	A report exists that concludes the concrete utilized to construct the as-built Circulating Water Makeup Intake Structure's below grade concrete foundation and walls have a maximum water to cementitious materials ratio of 0.45.

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Question 14.03.02-2 Item O

The staff has reviewed Calvert Cliffs Unit 3 COL Application, Part 10 – ITAAC, Appendix B Table 2.4-28 for New and Spent Fuel Storage Racks and has identified the need for the following information. The ITAAC should be revised accordingly to address each issue or a technical explanation should be provided for not including this information in the ITAAC.

1. For safety-related structures, ITAAC should require a reconciliation analysis of the as-built plant for all the structural design-basis loads and acceptance criteria. The analysis results are to be documented in a structural analysis report. Item 2 should be revised to specifically address this requirement for the new and spent fuel storage racks and should provide a reference to a report that will document that the acceptance criteria have been met. The ITAAC should also identify the location in the FSAR where the acceptance criteria can be found.

2. Item 3 only references as acceptance criteria the stress limits of ASME Section III, Subsection NF. This item should reference all the analysis and design criteria for the new and spent fuel storage racks.

3. Item 4 should reference the FSAR section that defines the acceptance criteria for the structural welds for the new and spent fuel storage racks.

4. Item 7 should reference the FSAR section that defines the structural materials for the new and spent fuel storage racks, as well as the technical bases for concluding that the materials for the spent fuel racks are corrosion-resistant and compatible with the expected water chemistry of the spent fuel pool.

Response

The ITAAC for new and spent fuel storage racks were removed as part of the UniStar Nuclear Energy letter transmitting the COLA changes related to new and spent fuel storage racks[5].

COLA Impact

The COLA FSAR will not be revised as a result of this response.

[5] UniStar Nuclear Energy Letter UN#10-047, from Greg Gibson to Document Control Desk, U.S. NRC, New and Spent Fuel Storage Racks, dated February 26, 2009