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10 CFR 50.4  
10 CFR 52.79

August 6, 2010

UN#10-217

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#10-160, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 118, Inspections, Tests, Analyses, and Acceptance Criteria, dated June 18, 2010
  - 3) UniStar Nuclear Energy Letter UN#10-171, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 118, Inspections, Tests, Analyses, and Acceptance Criteria, dated June 30, 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, 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.

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Reference 2 indicated that the response to RAI 118, Question 14.03.02-2, Item K Part 5 would be provided by August 6, 2010. Reference 3 indicated that the response to RAI 118, Question 14.03.02-2, Item G, Parts 2.b, 3, and 4 would be provided by August 6, 2010.

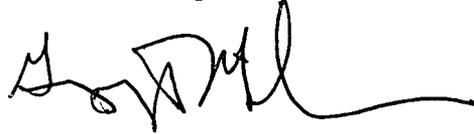
The enclosure provides our response to RAI No. 118, Question 14.03.02-2, Item G, Parts 2.b, 3, and 4 and Item K Part 5, and includes revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA.

Our 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 August 6, 2010

A handwritten signature in black ink, appearing to read 'Greg Gibson', with a long horizontal flourish extending to the right.

Greg Gibson

Enclosure: Response to NRC Request for Additional Information, RAI No. 118, Question 14.03.02-2, Item G, Parts 2.b, 3, and 4 and Item K Part 5, 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  
Loren Plisco, Deputy Regional Administrator, NRC Region II  
Silas Kennedy, U.S. NRC Resident Inspector, CCNPP, Units 1 and 2  
U.S. NRC Region I Office

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**Enclosure**

**Response to NRC Request for Additional Information**

**RAI No. 118, Question 14.03.02-2, Item G, Parts 2.b, 3, and 4 and Item K Part 5,**

**Calvert Cliffs Nuclear Power Plant, Unit 3**

**RAI 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

The response to Part 1, Part 2 a and c, and Part 3 (as it applied to a and c of Part 2) was provided in UNE letter UN#10-071<sup>1</sup>.

### Part 2.b:

Item 1 has been deleted from Tables 2.4-2 through 2.4-6. The waterproofing membrane does not serve a safety-related function. However, discussion of the membrane including installation and inspection procedures during construction and a new ITAAC for the membrane (Table 2.4-37) is provided in the response to RAI 144 Question 03.08.04-4 submitted in UNE Letter UN#10-193<sup>2</sup>.

### Part 3:

For the reasons stated in response to Part 2b of this question, the following items are also deleted:

Item 2 has been deleted from Table 2.4-7;

Item 2 has been deleted from Table 2.4-8;

Items 6 and 8 have been deleted from Table 2.4-9; and

Item 3 has been deleted from Table 2.4-10.

### Part 4:

Item 1 in ITAAC Table 2.4-2 has been deleted as noted in response to Part 2b of this question. Therefore, Item 1 is not included in ITAAC Tables 2.4-11 through 2.4-20.

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.

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

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<sup>1</sup> UN#10-071, Greg Gibson letter to U.S. NRC Document Control Desk, Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3, RAI No. 118, Structural and System Engineering – Inspections, Tests, Analysis and Acceptance Criteria, dated March 31, 2010.

<sup>2</sup> UN#10-193, Greg Gibson letter to U.S. NRC Document Control Desk, Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3, RAI No. 144, Other Seismic Category I Structures, and RAI No. 145, Foundations, dated July 23, 2010.

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, Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Tables 2.4-2, through 2.4-12 and 2.4-19 are revised as shown on the following pages.

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

|   | <b>Commitment Wording</b>   | <b>Inspection, Test, or Analysis</b>                       | <b>Acceptance Criteria</b>  |
|---|---|--|---|
| 4 | 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. | 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. |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>  | <b>Inspection, Test, or Analysis</b>                                  | <b>Acceptance Criteria</b>  |
|---|--|---|---|
| 4 | <del>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.</del> | <del>An inspection of the as-built structure will be conducted.</del> | <del>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.</del> |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>   | <b>Inspection, Test, or Analysis</b>                       | <b>Acceptance Criteria</b>  |
|---|---|--|---|
| 4 | 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. | 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. |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>   | <b>Inspection, Test, or Analysis</b>                       | <b>Acceptance Criteria</b>  |
|---|---|--|---|
| 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. | 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. |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>   | <b>Inspection, Test, or Analysis</b>                                  | <b>Acceptance Criteria</b>   |
|---|---|---|--|
| 4 | <del>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.</del> | <del>An inspection of the as-built structure will be conducted.</del> | <del>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.</del> |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>  | <b>Inspection, Test, or Analysis</b>                       | <b>Acceptance Criteria</b>   |
|---|--|--|--|
| 2 | 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. | 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. |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>  | <b>Inspection, Test, or Analysis</b>                       | <b>Acceptance Criteria</b>  |
|---|--|--|---|
| 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. | For the as-built UHS Electrical Building's below grade concrete foundation and walls, the waterproofing membrane eliminates direct contact of ground water chemicals. |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>   | <b>Inspection, Test, or Analysis</b>                       | <b>Acceptance Criteria</b>  |
|---|---|--|---|
| 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 and concludes that for the as-built buried Seismic Category I electrical duct banks, the as-installed waterproofing membrane eliminates direct contact of ground water chemicals. |
| 8 | Protective measures for buried Seismic Category I pipe include protective waterproof wrapping or coating.   | An inspection of the as-built piping will be conducted.    | As-built Seismic Category I pipes are protected by a protective waterproof wrapping or coating.   |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>   | <b>Inspection, Test, or Analysis</b>                       | <b>Acceptance Criteria</b>  |
|---|---|--|---|
| 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. | 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. |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>  | <b>Inspection, Test, or Analysis</b>  | <b>Acceptance Criteria</b>   |
|---|--|---|--|
| 4 | For the Turbine Building's below grade concrete foundation and walls exposed to ground water, 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. | <p><del>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.</del></p> <p><u>The concrete utilized to construct the as-built Turbine Building below grade concrete foundation and walls met the following:</u></p> <ul style="list-style-type: none"> <li>a. <u>A maximum water to cementitious materials ratio of 0.45.</u></li> <li>b. <u>Contains a quantity of supplementary cementitious material appropriate for the exposure condition.</u></li> </ul> |

Renumber remaining sections.

**Table 2.4-12—{Switchgear Building Inspections, Tests, Analyses, and Acceptance Criteria}**

|   | <b>Commitment Wording</b>   | <b>Inspection, Test, or Analysis</b>   | <b>Acceptance Criteria</b>  |
|---|---|--|---|
| 4 | <u>For the Switchgear Building below grade concrete foundation and walls, a low water to cement ratio concrete and improved concrete mixture design will be utilized.</u> | <u>Tests will be conducted to ensure the concrete meets specific parameters.</u> | <u>The concrete utilized to construct the as-built Switchgear Building below grade concrete foundation and walls met the following:</u><br>a. <u>A maximum water to cementitious materials ratio of 0.45.</u><br>b. <u>Contains a quantity of supplementary cementitious material appropriate for the exposure condition.</u> |

Renumber remaining sections.

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

|   | <b>Commitment Wording</b>   | <b>Inspection, Test, or Analysis</b>  | <b>Acceptance Criteria</b>   |
|---|---|---|--|
| 2 | For the Circulating Water Makeup Intake Structure below grade concrete foundation and walls, a low water to cement ratio concrete and improved 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. | <p><del>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 0.40.</del></p> <p><u>The concrete utilized to construct the as-built Circulating Water Makeup Intake Structure below grade concrete foundation and walls met the following:</u></p> <ul style="list-style-type: none"> <li><u>a. A maximum water to cementitious materials ratio of 0.40.</u></li> <li><u>b. Contains a quantity of supplementary cementitious material appropriate for the exposure condition.</u></li> </ul> |

Renumber remaining sections.

**RAI 118**

**Question 14.03.02-2**

**Item K**

The staff has reviewed Calvert Cliffs Unit 3 COL Application, Part 10 – ITAAC, Appendix B Table 2.4-9 for Buried Duct Banks and Pipes 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. Items 1 and 2 should reference engineering drawings that show the location of all the Seismic Category I buried piping and electrical duct banks.
2. Items 2 and 3 only reference ACI 349 and ANSI/AISC 690. These items should reference all the analysis and design criteria for the concrete and steel components.
3. For safety-related structures, ITAAC should require an analysis for reconciling the as-built plant with all the structural design-basis loads and acceptance criteria. The analysis results are to be documented in a structural analysis report. Items 3, 4 and 5 should be revised to specifically address this requirement 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.
4. The sentence describing the acceptance criteria for item 5 is not a complete sentence since it refers to “the following design basis loads” and none are provided. Reference should be made to all design basis loads and a reference to the specific FSAR sections that define these loads should be provided.
5. For Item 8, provide a reference to the section in the FSAR that describes the criteria for the use of waterproof wrapping or coating for buried pipes. Also describe or reference a section in the FSAR that describes the inspection procedure that will be used to provide assurance that the waterproof wrapping or coating for buried pipes will cover the entire surface of the piping. Also describe the inspection procedure that will be used to assure that no damage to the membrane or coating has occurred during construction.

**Response:**

The response to Parts 1 through 4 was provided in provided in UNE letter UN#10-160<sup>3</sup>.

**Part 5:**

Items 6 and 8 have been deleted from Table 2.4-9 as discussed in the response to Question 14.03.02-2G (above).

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<sup>3</sup> UN#10-160, Greg Gibson letter to U.S. NRC Document Control Desk, Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3, RAI No. 118, Structural and System Engineering – Inspections, Tests, Analysis and Acceptance Criteria, dated June 18, 2010.

**COLA Impact**

COLA Part 10, Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Tables 2.4-9 is revised as shown in the response to Question 14.03.02-2G.