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10 CFR 50.4  
10 CFR 52.79

March 31, 2010

UN#10-090

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. 161, Piping Systems and Components –  
Inspections, Tests, Analyses, and Acceptance Criteria

- References:
- 1) Surinder Arora (NRC) to Robert Poche (UniStar Nuclear Energy), "FINAL RAI No 161 EMB2 3365" email dated September 29, 2009
  - 2) UniStar Nuclear Energy Letter UN#09-492, from Greg Gibson to Document Control Desk, U.S. NRC, Submittal of Response to RAI No. 161, Piping Systems and Components - Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC), dated December 15, 2009

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 September 29, 2009 (Reference 1). This RAI addresses Piping Systems and Components - 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.

Reference 2 indicated that the response to Question 14.03.03-3 would be provided by March 31, 2010.

DD 96  
NRD

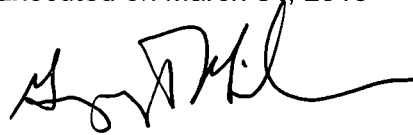
The enclosure provides our response to RAI No. 161, Question 14.03.03-3, and includes revised COLA content. A Licensing Basis Document Change Request has been initiated to incorporate these changes into a future revision of the COLA.

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 March 31, 2010



Greg Gibson

Enclosure: Response to NRC Request for Additional Information RAI No. 161, Question 14.03.03-3, Piping Systems and Components - 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. 161, Question 14.03.03-3, Piping Systems and Components –  
Inspections, Tests, Analyses, and Acceptance Criteria,  
Calvert Cliffs Nuclear Power Plant, Unit 3**

**RAI No. 161**

**Question 14.03.03-3**

Seismic Category I Equipment

10 CFR 52.80(a) requires that a COL application must contain:

“(a) The proposed inspections, tests, and analyses [ITA], including those applicable to emergency planning, that the licensee shall perform, and the acceptance criteria [AC] that are necessary and sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria met, the facility has been constructed and will be operated in conformity with the combined license, the provisions of the [Atomic Energy] Act, and the Commission's rules and regulations.”

RG 1.206, C.II.1.1 states that acceptance criteria should be objective and unambiguous.

In the Calvert Cliffs Nuclear Power Plant, Unit 3 COL application, Part 10, ITAAC, Appendix B, Table 2.4-24, item 5, the applicant states in the Commitment Wording that “The following UHS Makeup Water System equipment is designated as Seismic Category I, and is designed to withstand a design basis seismic load without loss of safety function.”

(1) In its letter dated May 28, 2009, UniStar Nuclear Energy responded to RAI No. 70, Question 14.03.03-01 by revising the ITAAC in Part 10 of the Calvert Cliffs Nuclear Power Plant Unit 3 COL application, Appendix B, Table 2.4-24, item 9. In the RAI response, the applicant added the Table 2.4-32, UHS Makeup Water System Component Mechanical Design to the FSAR. The table identified the seismic categories of equipment in the UHS Makeup Water System. The staff requested the change the Commitment Wording in item 5 of Table 2.4-24 to reference the new Table 2.4-32 as follow: “The Seismic Category I equipment identified in Table 2.4-32 can withstand seismic design basis loads without loss of safety-function.”

(2) In item 5a, the AC stated that the as-installed UHS Makeup Water System equipment designated as Seismic Category I can withstand a design basis seismic load without loss of safety function. It is not clear to the staff how the AC can be concluded by the proposed ITA. For the as-built equipment, an acceptable ITAAC is to require a reconciliation analysis of the as-built equipment for all the design-basis loads and acceptance criteria. The analysis results are to be documented in analysis report(s). During the review of the ITAAC for Seismic Category I equipment in the EPR FSAR Tier 1, the staff identified the same concern to AREVA. The staff indicated that an acceptable approach to address ITAAC for Seismic Category I equipment is as follows:

**The 2nd column ITA**

a. Type tests, analyses, or a combination of type tests and analyses will be performed on the Seismic Category I equipment identified in Table 2.4-32 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements.

b. Inspections will be performed of the as-installed seismic Category I equipment listed in Table 2.4-32 to verify that the equipment including anchorage is seismically bounded by the tested or analyzed conditions.

### **The 3rd column AC**

- a. Test/analysis reports exist and conclude that the seismic Category I equipment listed in Table 2.4-32 can withstand seismic design basis loads without loss of safety function.
- b. Inspection reports exist and conclude that the as-installed seismic Category I equipment listed in Table 2.4-32 including anchorage are seismically bounded by the tested or analyzed conditions.

The staff requests the applicant to evaluate these deficiencies in (1) and (2) and revise the ITAAC for Seismic Category I equipment. This question is also applicable to Table 2.4-21, Table 2.4-22, Table 2.4-23, Table 2.4-28, Table 2.4-31 and other systems that consist of Seismic Category I equipment.

### **Response**

The Inspections, Tests, Analyses and Acceptance Criteria (ITAAC) associated with Seismic Category I equipment contained in COLA Part 10, Appendix B, Tables 2.4-7, 2.4-8, 2.4-9, 2.4-21, 2.4-22, 2.4-24, 2.4-31 and 2.4-33 are being revised to address the areas of concern identified by the staff in RAI 161, Question 14.03.03-3, Items 1 and 2. No changes are proposed for Table 2.4-23, as the equipment is Seismic Category II-SSE. No changes are proposed for Table 2.4-28, as this table was deleted in the UniStar Nuclear Energy letter transmitting the COLA changes related to new and spent fuel storage racks<sup>1</sup>.

### **COLA Impact**

COLA Part 10, Appendix B, Tables 2.4-7, 2.4-8, 2.4-9, 2.4-21, 2.4-22, 2.4-24, 2.4-31 and 2.4-33 are updated as follows: (The table excerpts include changes previously provided in response to RAI 118<sup>2</sup> and RAI 182<sup>3</sup>):

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<sup>1</sup> UniStar Nuclear Energy Letter UN#10-047, from G. Gibson to Document Control Desk, U.S. NRC, New and Spent Fuel Storage Racks, dated February 26, 2010 (ADAMS Accession ML100610289).

<sup>2</sup> UniStar Nuclear Energy Letter UN#09-496, from Greg Gibson to Document Control Desk, U.S. NRC, Update to Calvert Cliffs Nuclear Power Plant, Unit 3 RAI No. 118, Inspections, Tests, Analyses and Acceptance Criteria (ITAAC), dated December 4, 2009.

<sup>3</sup> UniStar Nuclear Energy Letter UN#10-078, from Greg Gibson to Document Control Desk, U.S. NRC, Update to Calvert Cliffs Nuclear Power Plant, Unit 3 RAI No. 182, System Quality Group Classification, dated March 12, 2010.

**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
2	<p>The UHS Makeup Water Intake Structure, including the interior structures, is Seismic Category I and is designed to withstand design basis loads and load combinations without a loss of structural integrity.</p>	<p>a. <u>Type tests, analyses, or a combination of type tests and analyses</u> An analysis will be performed <del>on to determine that the</del> UHS Makeup Water Intake Structure, including the interior structures, <u>using analytical assumptions, or under conditions which bound the Seismic Category I design requirements and to determine that the UHS Makeup Water Intake Structure, including the interior structures, is designed to withstand design basis loads and load combinations without loss of structural integrity.</u></p>	<p>a. <u>Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the A report exists that concludes the as-built UHS Makeup Water Intake Structure, including its interior structures, can withstand design basis seismic loads without loss of safety function and is capable of withstanding the structural design basis loads in accordance with the Structural Acceptance Criteria in FSAR Section 3.8.4.5.</u></p>
		<p>b. An inspection will be <del>conducted</del> <u>performed</u> of the as-built Makeup Water Intake Structure, including its interior structures, <u>to verify that the components, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u></p>	<p>b. <u>Inspection reports exist and conclude that A report exists that concludes the as-built Makeup Water Intake Structure, including its interior structures, is constructed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u> <del>agrees with construction drawings and deviations from the approved design are reconciled.</del></p>

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

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
1	<p>The UHS Electrical Building, including its interior structures, is Seismic Category I, and is designed to withstand design basis loads and load combinations without a loss of structural integrity per FSAR Section 3.8.4.3.</p>	<p>a. <u>Type tests, analyses, or a combination of type tests and analyses</u> An analysis will be performed on to <del>determine that the UHS Electrical Building, including its interior structures, using analytical assumptions, or under conditions which bound the Seismic Category I design requirements and to determine that the UHS Electrical Building, including its interior structures, is designed to withstand design basis loads and load combinations without a loss of structural integrity per FSAR Section 3.8.4.3.</del></p>	<p>a. <u>Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the A report exists that concludes the as-built UHS Electrical Building, including its interior structures, can withstand design basis seismic loads without loss of safety function and is capable of withstanding all the structural design basis loads in accordance with the Structural Acceptance Criteria per FSAR Section 3.8.4.5.</u></p>
		<p>b. An inspection will be <u>conducted performed</u> of the <u>as-built</u> UHS Electrical Building, including its interior structures, <u>to verify that the components, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u></p>	<p>b. <u>Inspection reports exist and conclude that A report exists that concludes the as-built UHS Electrical Building, including its interior structures, is constructed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u> <del>agrees with construction drawings and deviations from the approved design are reconciled.</del></p>

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

	Commitment Wording	Inspection, Tests, or Analysis	Acceptance Criteria
5	<p>The buried Seismic Category I electrical duct banks and pipes can withstand design basis loads without loss of structural integrity. These loads are:</p> <ol style="list-style-type: none"> <li>1. Strains imposed by seismic ground motion.</li> <li>2. Static surface surcharge loads due to vehicular loads on designated haul routes.</li> <li>3. Static surface surcharge loads during construction activities.</li> <li>4. Tornado missiles and, within their zone of influence, turbine generated missiles.</li> <li>5. Ground water effects.</li> </ol>	<p><u>a. Type tests, analyses, or a combination of type tests and analyses will be performed on the As-built buried Seismic Category I electrical duct banks and pipes using analytical assumptions, or under conditions which bound the Seismic Category I design requirements, will be conducted.</u></p>	<p><u>Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the As-built buried Seismic Category I electrical duct banks and pipes conform to the approved design and can withstand the following design basis loads without loss of safety function structural integrity:</u></p> <ol style="list-style-type: none"> <li>1. Strains imposed by seismic ground motion.</li> <li>2. Static surface surcharge loads due to vehicular loads on designated haul routes.</li> <li>3. Static surface surcharge loads during construction activities.</li> <li>4. Tornado missiles and, within their zone of influence, turbine generated missiles.</li> <li>5. Ground water effects.</li> </ol>
		<p><u>b. Inspections will be performed of the as-built electrical duct banks and pipes to verify that the components, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u></p>	<p><u>b. Inspection reports exist and conclude that the as-built Seismic Category I electrical duct banks and pipes, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u></p>



**Table 2.4-21—{Ultimate Heat Sink Makeup Water Intake Structure Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria}**

6	<p>UHS Makeup Water Intake Structure Ventilation System equipment, piping, and ducting is designated as Seismic Category I, and can withstand design basis seismic loads without loss of safety function.</p>	<p>a. Type tests, <del>tests,</del> analyses, or a combination of <u>type tests and analyses will be performed on the UHS Makeup Water Intake Structure Ventilation System</u> equipment, piping, and ducting <u>designated as Seismic Category I using analytical assumptions, or under conditions which bound the Seismic Category I design requirements.</u></p>	<p>a. <u>Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the UHS Makeup Water Intake Structure Ventilation System</u> The equipment, piping, and ducting designated as Seismic Category I for the <del>as-built UHS Makeup Water Intake Structure Ventilation System</del> can withstand design basis seismic loads without loss of safety function.</p>
		<p>b. <u>Inspections will be performed conducted of the as-built Seismic Category I UHS Makeup Water Intake Structure Ventilation System</u> equipment, piping, and ducting <u>to verify that the components, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u></p>	<p>b. <u>Inspection reports exist and conclude that the as-built Seismic Category I</u>The UHS Makeup Water Intake Structure Ventilation System equipment, piping, and ducting, <u>including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses), designated as Seismic Category I are installed as designed.</u></p>
		<p>c. <del>Inspections will be conducted of the as-built equipment supports and restraints.</del></p>	<p>c. <del>The as-built equipment supports and restraints are seismically bounded by tested or analyzed conditions.</del></p>

**Table 2.4-22—{Ultimate Heat Sink Electrical Building Ventilation System Inspections, Tests, Analyses, and Acceptance Criteria}**

6	<p>UHS Electrical Building Ventilation System equipment, piping, and ducting is designated as Seismic Category I, and can withstand design basis seismic loads without loss of safety function.</p>	<p>a. Type tests, tests, analyses, or a combination of <u>type tests and analyses</u> will be performed on the <u>UHS Electrical Building Ventilation System equipment, piping, and ducting designated Seismic Category I using analytical assumptions, or under conditions which bound the Seismic Category I design requirements.</u></p>	<p>a. <u>Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the</u> <del>The as-built</del> UHS Electrical Building Ventilation System equipment, piping, and ducting designated as Seismic Category I can withstand a design basis seismic loads without loss of safety function.</p>
		<p>b. Inspections will be <del>performed</del> <u>conducted of the as-built Seismic Category I UHS Electrical Building Ventilation System equipment, piping, and ducting designated Seismic Category I to verify that the as-built equipment, piping, and ducting, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u></p>	<p>b. <u>Inspection reports exist and conclude that the as-built</u> <del>The</del> UHS Electrical Building Ventilation System equipment, piping, and ducting <u>designated Seismic Category I, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u> <del>designated as Seismic Category I are installed as designed.</del></p>
		<p>c. <del>Inspections will be conducted of the as-built equipment supports and restraints.</del></p>	<p>c. <del>The as-built equipment supports and restraints are seismically bounded by tested or analyzed conditions.</del></p>

**Table 2.4-24—{Ultimate Heat Sink Makeup Water System Inspections, Tests, Analyses, and Acceptance Criteria}**

<p>5</p>	<p>The following UHS Makeup Water System equipment is designated as Seismic Category I, and is designed to withstand a design basis seismic load without loss of safety function. UHS Makeup Water Pumps. UHS Makeup Water Pump Motors. Piping to ESW Cooling Towers. Discharge Strainers. Isolation Valves. Isolation Valves for Equipment. Valves in the pathway from the UHS Makeup Water Pumps to the ESW Cooling Towers. Instruments and Controls. Electrical Distribution Equipment.</p>	<p>a. Type tests, tests, analyses, or a combination of <u>type tests and analyses will be performed on the UHS Makeup Water System equipment identified Seismic Category I in Table 2.4-32 using analytical assumptions, or under conditions which bound the Seismic Category I design requirements.</u></p>	<p>a. <u>Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the Seismic Category I The as-installed UHS Makeup Water System equipment designated as Seismic Category I identified in Table 2.4-32 can withstand a design basis seismic loads without loss of safety function.</u></p>
		<p>b. Inspections will be <u>performed conducted of the as-built UHS Makeup Water System equipment identified in Table 2.4-32 to verify that the as-built equipment, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u></p>	<p>b. <u>Inspection reports exist and conclude that the as-built Seismic Category I The UHS Makeup Water System equipment designated as Seismic Category I identified in Table 2.4-32, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses) is installed as designed.</u></p>
		<p>c. <u>Inspections will be conducted of the as-installed equipment supports and restraints.</u></p>	<p>c. <u>The as-installed equipment supports and restraints are seismically bounded by tested or analyzed conditions.</u></p>

**Table 2.4-31—{Class 1E Emergency Power Supply Components for Site-Specific Systems Inspections, Tests, Analyses, and Acceptance Criteria}.**

1	<p>The Class 1E electrical distribution equipment is qualified as Seismic Category I, and can withstand seismic design basis loads without loss of safety function, for the following systems: 1. UHS Makeup Water System. 2. UHS Makeup Water Intake Structure Ventilation System. 3. UHS Electrical Building Ventilation System.</p>	<p>a. <u>Type tests, analyses, testing, analysis, or a combination of type tests and analyses testing and analysis will be performed on the Class 1E electrical distribution equipment designated Seismic Category I using analytical assumptions or under conditions which bound the Seismic Category I design requirements.</u></p>	<p>a. <u>Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the Seismic Category I. The Class 1E electrical distribution equipment for the as-built UHS Makeup Water System, UHS Makeup Water Intake Ventilation System, and UHS Electrical Building Ventilation System designated Seismic Category I can withstand a design basis seismic loads without loss of safety function.</u></p>
		<p>b. <u>Inspections will be performed An inspection of on the as-built Class 1E electrical distribution equipment to verify that the as-built equipment, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses). will be conducted.</u></p>	<p>b. <u>Inspection reports exist and conclude that the as-built Seismic Category I The Class 1E electrical distribution equipment for the as-built UHS Makeup Water System, UHS Makeup Water Intake Ventilation System, and UHS Electrical Building Ventilation System designated Seismic Category I, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses). is installed as designed.</u></p>
		<p>c. <u>An inspection of the as-built equipment supports and restraints will be performed.</u></p>	<p>c. <u>The as-built equipment supports and restraints for the Class 1E electrical distribution equipment for the as-built UHS Makeup Water System, UHS Makeup Water Intake Ventilation System, and UHS Electrical Building Ventilation System are installed as design.</u></p>

**Table 2.4-33—{Forebay Structure Inspections, Tests, Analyses, and Acceptance Criteria}**

1	<p>The Forebay Structure is Seismic Category I and is designed to withstand structural design basis loads and load combinations per FSAR Section 3.8.4.3.</p>	<p>a. <u>Type tests, analyses, or a combination of type tests and analyses</u> An analysis will be performed on to determine that the Forebay Structure <u>using analytical assumptions, or under conditions which bound the Seismic Category I design requirements and to determine that the Forebay Structure</u> is designed to withstand structural design basis loads and load combinations per FSAR Section 3.8.4.3.</p>	<p>a. <u>Seismic qualification reports (SQPD, EQPD, or analyses) exist and conclude that the A-report exists that concludes the as-built Forebay Structure can withstand design basis seismic loads without loss of safety function and is capable of withstanding the structural design basis loads in accordance with the Structural Acceptance Criteria referenced in FSAR Section 3.8.4.5.</u></p>
		<p>b. An inspection <u>will be performed of the as-built Forebay Structure will be conducted to verify that the components, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses).</u></p>	<p>b. <u>Inspection reports exist and conclude that A report exists that concludes the as-built Forebay Structure is constructed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQPD, EQPD, or analyses). agrees with construction drawings and deviations from the approved design are reconciled.</u></p>