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August 23, 2023  
E-62581

U. S. Nuclear Regulatory Commission  
Director of the Office of Nuclear Material Safety and Safeguards  
Attn: Document Control Desk  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852

Subject: Proposed Additional Alternative to the ACI Code, Concrete  
Temperature Limits, Docket 72-1042, CoC 1042 Amendments 1, 2,  
and 3

In accordance with Section 4.4.4 of Certificate of Compliance (CoC) No. 1042 Appendix A, NUHOMS® EOS System Generic Technical Specifications (TS), Amendments 1, 2, and 3, TN Americas LLC (TN) requests an additional code alternative to American Concrete Institute (ACI) 349-06, Appendix E, Section E.4, Concrete Temperatures.

This proposed alternate to the TS for Amendments 1, 2, and 3 is to allow for the use of a blended Portland cement that would be certified to the requirements of ASTM C595. The cement supplier will no longer provide cement in accordance with ASTM C150 since the supplier is transitioning to a cement with a smaller carbon footprint that includes 10% limestone. This change is needed to support continued EOS HSM and EOS HSM-MX fabrication activities.

The reinforced concrete HSM is designed in accordance with the provisions of ACI 349-06 per TS Section 4.4.1. Paragraph E.4.3 of ACI 349-06, in part, requires the testing of concrete for temperatures higher than those given in Paragraph E.4.1. The concrete temperature limit requirements for the higher temperatures for the HSMs are based on NUREG 1536 Revision 1, specifically Section 8.4.14.2, Concrete Temperature Limits, for normal and off-normal conditions.

Section 8.4.14.2.2 states:

If concrete temperatures in general or local areas exceed 93 °C (200 °F) but are less than 149 °C (300 °F), no tests are required to prove capability for elevated temperatures or reduced concrete strength if Type II cement is used and temperature appropriate aggregates are used.

TN has used Type II cement and temperature appropriate aggregates but based on industry transition to a non-Type II cement, this new code alternative is needed.

ACI 349-06 identifies several ASTM specifications for cement that are acceptable per the code requirements. ASTM C150 and ASTM C595 are two of the acceptable cement specifications identified in Section 3.2 of ACI 349-06.

Proposed Alternative:

The proposed alternative to the Code alternatives for the HSM concrete specifications as listed in TS Section 4.4.4 is as follows:

The concrete temperature limit criteria in NUREG-1536, Section 8.4.14.2 is used for normal and off-normal conditions.

Blended cement per ASTM C595 may be used in lieu of Portland cement Type II.

- The cement supplier, as of January 2023, will no longer provide cement in accordance with ASTM C150 because the industry is transitioning to a cement with a smaller carbon footprint that includes 10% limestone.
- ACI 349-06 identifies several ASTM specifications for cement that are acceptable per the code requirements. ASTM C150 and ASTM C595 are two of the acceptable cement specifications identified in Section 3.2 of ACI 349-06.
- Thermal compatibility tests conducted on concrete mixes using the two cement types show comparable strength results with no signs of degradation due to exposure to elevated temperatures.

Enclosures 1, 2, and 3 provide the proposed new code alternative table rows for CoC 1042.

Enclosure 4 provides a proprietary thermal compatibility test report summary utilizing ASTM C595 Portland-Limestone blended cement instead of the ASTM C150 Type II Portland cement. In accordance with 10 CFR 2.390, Enclosure 5 is being provided specifically requesting that you withhold this proprietary information from public disclosure. Because Enclosure 4 is entirely proprietary, no public version is provided.

Regarding environmental impacts, as discussed, this new proposed alternative provides for the use of cement with a smaller carbon footprint and would, therefore, have no environmental impact with respect to the NRC's NEPA regulations in 10 CFR Part 51.

As previously discussed with NRC staff, in order to support planned EOS HSM fabrication activities, NRC approval is requested by November 27, 2023. If the NRC staff has any questions regarding this submittal, please do not hesitate to contact Mr. Glenn Mathues at 410-910-6538 or [glenn.mathues@orano.group](mailto:glenn.mathues@orano.group).

Sincerely,

A handwritten signature in blue ink that reads "A. Prakash" with a small "P.O." written below the name.

Prakash Narayanan  
Chief Technical Officer

cc: Christian Jacobs (NRC-DFM)

Enclosures:

1. Proposed New Code Alternative Table Row for CoC 1042 Amendment 1
2. Proposed New Code Alternative Table Row for CoC 1042 Amendment 2
3. Proposed New Code Alternative Table Row for CoC 1042 Amendment 3
4. TN Americas Document E-62668, "Thermal Compatibility of CMH2 Concrete Mix"  
(Proprietary)
5. Affidavit Pursuant to 10 CFR 2.390

## Proposed New Code Alternative Row for CoC 1042 Amendment 1

### Amendment 1

REFERENCE ACI-349-06 SECTION/ARTICLE	CODE REQUIREMENT	ALTERNATIVES, JUSTIFICATION AND COMPENSATORY MEASURES
Appendix E, Section E.4-Concrete Temperatures.	Section E.4.1 specifies that the concrete temperatures for normal operations shall not exceed 150 °F except for local areas such as around penetrations, which are allowed to have increased temperatures not to exceed 200 °F.	<p>The concrete temperature limit criteria in NUREG-1536, Revision 1, Section 8.4.14.2 is used for normal and off-normal conditions.</p> <p>Blended cement per ASTM C595 may be used in lieu of Portland cement Type II.</p> <ul style="list-style-type: none"> <li>• The cement supplier, as of January 2023, will no longer provide cement in accordance with ASTM C150 because the industry is transitioning to a cement with a smaller carbon footprint that includes 10% limestone.</li> <li>• ACI 349-06 identifies several ASTM specifications for cement that are acceptable per the code requirements. ASTM C150 and ASTM C595 are two of the acceptable cement specifications identified in Section 3.2 of ACI 349-06.</li> <li>• Thermal compatibility tests conducted on concrete mixes using the two cement types show comparable strength results with no signs of degradation due to exposure to elevated temperatures.</li> </ul>

## Proposed New Code Alternative Row for CoC 1042 Amendment 2

### Amendment 2

REFERENCE ACI-349-06 SECTION/ARTICLE	CODE REQUIREMENT	ALTERNATIVES, JUSTIFICATION AND COMPENSATORY MEASURES
Appendix E, Section E.4-Concrete Temperatures.	Section E.4.1 specifies that the concrete temperatures for normal operations shall not exceed 150 °F except for local areas such as around penetrations, which are allowed to have increased temperatures not to exceed 200 °F.	<p>The concrete temperature limit criteria in NUREG-1536, Revision 1, Section 8.4.14.2 is used for normal and off-normal conditions.</p> <p>Blended cement per ASTM C595 may be used in lieu of Portland cement Type II.</p> <ul style="list-style-type: none"> <li>• The cement supplier, as of January 2023, will no longer provide cement in accordance with ASTM C150 because the industry is transitioning to a cement with a smaller carbon footprint that includes 10% limestone.</li> <li>• ACI 349-06 identifies several ASTM specifications for cement that are acceptable per the code requirements. ASTM C150 and ASTM C595 are two of the acceptable cement specifications identified in Section 3.2 of ACI 349-06.</li> <li>• Thermal compatibility tests conducted on concrete mixes using the two cement types show comparable strength results with no signs of degradation due to exposure to elevated temperatures.</li> </ul>

## Proposed New Code Alternative Row for CoC 1042 Amendment 3

### Amendment 3

REFERENCE ACI-349-06 SECTION/ARTICLE	CODE REQUIREMENT	ALTERNATIVES, JUSTIFICATION AND COMPENSATORY MEASURES
<p>Appendix E, Section E.4-Concrete Temperatures.</p>	<p>Section E.4.1 specifies that the concrete temperatures for normal operations shall not exceed 150 °F except for local areas such as around penetrations, which are allowed to have increased temperatures not to exceed 200 °F.</p>	<p>The concrete temperature limit criteria in NUREG-1536, Revision 1, Section 8.4.14.2 is used for normal and off-normal conditions.</p> <p>Blended cement per ASTM C595 may be used in lieu of Portland cement Type II.</p> <ul style="list-style-type: none"> <li>• The cement supplier, as of January 2023, will no longer provide cement in accordance with ASTM C150 because the industry is transitioning to a cement with a smaller carbon footprint that includes 10% limestone.</li> <li>• ACI 349-06 identifies several ASTM specifications for cement that are acceptable per the code requirements. ASTM C150 and ASTM C595 are two of the acceptable cement specifications identified in Section 3.2 of ACI 349-06.</li> <li>• Thermal compatibility tests conducted on concrete mixes using the two cement types show comparable strength results with no signs of degradation due to exposure to elevated temperatures.</li> </ul>

**Enclosure 4 to E-62581**

**TN Americas Document E-62668, “Thermal  
Compatibility of CMH2 Concrete Mix”**

**Withheld Pursuant to 10 CFR 2.390**

**TN AMERICAS LLC AFFIDAVIT PURSUANT  
TO 10 CFR 2.390**

State of Maryland:  
County of HOWARD:

I, Prakash Narayanan, depose and say that I am Chief Technical Officer of TN Americas LLC, duly authorized to execute this affidavit, and have reviewed or caused to have reviewed the information that is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conformance with the provisions of 10 CFR 2.390 of the Commission's regulations for withholding this information.

The information for which proprietary treatment is sought meets the provisions of paragraph (a) (4) of Section 2.390 of the Commission's regulations. The information is contained in Enclosure 4, as listed below:

- Enclosure 4 – Thermal Compatibility of CHM2 Concrete Mix (Proprietary)

I have personal knowledge of the criteria and procedures utilized by TN Americas LLC in designating information as a trade secret, privileged or as confidential commercial or financial information. This document has been appropriately designated as proprietary.

Pursuant to the provisions of paragraph (b) (4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

- 1) The information sought to be withheld from public disclosure involves concrete mix testing data related to the design of the NUHOMS® EOS System, which is owned by and has been held in confidence by TN Americas LLC.
- 2) The information is of a type customarily held in confidence by TN Americas LLC, and not customarily disclosed to the public. TN Americas LLC has a rational basis for determining the types of information customarily held in confidence by it.
- 3) Public disclosure of the information is likely to cause substantial harm to the competitive position of TN Americas LLC, because the information consists of descriptions of the design and validation of dry spent fuel storage systems, the application of which provide a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with TN Americas LLC, take marketing or other actions to improve their product's position or impair the position of TN Americas LLC's product, and avoid developing similar data and analyses in support of their processes, methods, or apparatus.

I declare that the statements set forth in this affidavit are true and correct to the best of my knowledge, information, and belief. I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 8/18/2023



Prakash Narayanan  
Chief Technical Officer, TN Americas LLC