



November 4, 2016
E-46745

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Subject: Input Regarding TN Americas LLC 10 CFR 72.48 Evaluation Numbered 721004-1432
Revision 1

Reference: Standardized NUHOMS® System, Docket No. 72-1004

Background:

In April 2016, the NRC conducted a periodic inspection of TN Americas LLC's (TN's) implementation program for 10 CFR 72.48. After further NRC review of one of TN's 10 CFR 72.48 evaluations, the NRC has pre-decisionally determined that TN has potentially violated the provisions of 10 CFR 72.48, with two identified instances. This potential violation involves changes TN made to two methods of evaluation (MOEs) described in the Standardized NUHOMS® System UFSAR for Certificate of Compliance (CoC) 1004. The NRC has stated that the changes to the MOEs in question should have been considered departures from an MOE as defined in 10 CFR 72.48(a)(2), for which TN should have sought NRC approval via an amendment to CoC 1004. TN has been afforded the opportunity to provide additional information to the NRC pertaining to the potential violation. The purpose of this letter is to provide that additional information and to demonstrate that TN is in compliance with the provisions of 10 CFR 72.48.

Regulatory Basis:

TN uses Regulation 10 CFR 72.48 (including the Statement(s) of Consideration), NRC Regulatory Guide 3.72, "Guidance for Implementation of 10 CFR 72.48, Changes, Test, and Experiments," and NEI 96-07 Revision 1, Appendix B, "Guidelines for 10 CFR 72.48 Implementation," as the bases for the TN 10 CFR 72.48 process implementing procedure.

Of these sources, the detailed guidance is contained in NEI 96-07 Revision 1, Appendix B. NRC Regulatory Guide 3.72 endorses NEI 96-07 Revision 1, Appendix B as follows: Regulatory Position 1 states that NEI 96-07 Revision 1, Appendix B, provides methods that are acceptable to the NRC staff for complying with the provisions of 10 CFR 72.48. The only exception to this are cautions regarding the examples provided in Appendix B.

The NEI 96-07 Revision 1, Appendix B guidance for ensuring that a change, test, or experiment does not result in a departure from an MOE is contained in Definition B3.4, "Departure from a Method of Evaluation Described in the FSAR (as updated) Used in Establishing the Design Bases or in the Safety Analyses," Definition B3.10, "Method of Evaluation," and Section B4.3.8, "Does the Activity

TN AMERICAS LLC

7135 Minstrel Way, Suite 300, Columbia, Maryland 21045
Tel.: 410 910 6900 - Fax: 410 910 6902 - www.us.aveva.com/AREVATN

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Result in a Departure from a Method of Evaluation Described in the UFSAR Used in Establishing the Design Bases or in the Safety Analyses?"

Definition B3.4 defines a departure from an MOE as follows: "Departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses means (i) changing any of the elements of the method described in the FSAR (as updated) unless the results of the analysis are conservative or essentially the same; or (ii) changing from a method described in the FSAR to another method unless that method has been approved by NRC for the intended application."

Definition B3.4 provides additional detailed guidance regarding "Conservative vs. Non-Conservative Evaluation Results," and "Essentially the Same." Definition B3.4 also goes on to state, in part, that "Rather than make a minor change to an existing method of evaluation, a licensee may also adopt completely new methodology without prior NRC approval provided the new method is approved by the NRC for the intended application. A new method is "approved by the NRC for the intended application" if it is approved for the type of analysis being conducted and the licensee or CoC holder satisfies applicable terms and conditions for its use."

Definition B3.10 defines an MOE as follows: "Methods of evaluation means the calculational framework used for evaluating behavior or response of the ISFSI facility, cask design, or an SSC." Definition B3.10 also goes on to provide guidance on defining elements of methodologies.

Section B4.3.8 contains subsections B4.3.8.1, "Guidance for Changing One or More Elements of a Method of Evaluation," and B4.3.8.2, "Guidance for Changing from One Method of Evaluation to Another," which are specifically applicable to the situation discussed here.

Consistent with Definition B3.4, as stated in Subsection B4.3.8.1, "Changes to elements of analysis methods that yield conservative results, or results that are essentially the same over the entire range of use for the method would not be departures from approved methods."

Consistent with Definition B3.4, as stated in Subsection B4.3.8.2, "A new method is approved by the NRC for intended application if it is approved for the type of analysis being conducted, and applicable terms, conditions and limitations for its use are satisfied."

TN's assessments below demonstrate that TN is in compliance with the guidance in NEI 96-07 Revision 1, Appendix B cited above. This guidance for complying with the provisions of 10 CFR 72.48 has been endorsed by NRC in NRC Regulatory Guide 3.72.

Description of the Instances and TN Assessments:

The MOE changes involved in this situation pertain to a modification to the fuel basket of the 32PTH1 dry shielded canister (DSC). These changes to the fuel basket design were made to slightly increase the fuel cell opening to increase the clearance for fitting a B&W 15x15 fuel assembly type into the basket. These modifications required TN to evaluate the impacts on the approved technical evaluations for the 32PTH1 DSC and review the changes pursuant to 10 CFR 72.48. The two identified instances are discussed below.

Instance 1 – New Element of a Method Regarding Criticality:

The NRC states that TN's use of computer software package SCALE Version 6.0 instead of Version 4.4 to perform a criticality sensitivity analysis of the modified 32PTH1 DSC basket is a change to an element of an MOE. Further, the NRC states that this change constitutes a

departure from an MOE because the results of the analysis with the revised element of the MOE are not conservative or essentially the same per 10 CFR 72.48(a)(2)(i). Such a departure from an MOE would require prior NRC approval per 10 CFR 72.48(c)(2)(viii).

Specifically, a SCALE 6.0 analysis of the original 32PTH1 criticality analysis model was not performed and compared directly to the SCALE 4.4 results documented in the UFSAR to demonstrate that the change in the element of the MOE yields results which are conservative or essentially the same.

TN Assessment of the Potential Violation:

TN employed the guidance provided by NEI 96-07, Appendix B Section B3.4 and Section B3.10, which discuss MOE, to evaluate the impact of this change on the CoC licensing basis.

As described in the 72.48 full evaluation, a Two-Step licensing approach (described below) was employed to demonstrate that the documented criticality evaluation complied with the "Essentially the Same" requirement as defined in Section B3.4 of NEI 96-07 Revision 1, Appendix B. The objective of this approach was to confirm that the design basis model from the original analyses, as documented in the UFSAR (U.6.4.2.B), remains unchanged due to the proposed change associated with the 32PTH1 Type 2-W. Therefore, these calculations were limited to comparing the differences in reactivity (Δk_{eff}) and were not performed to establish a new design bases (k_{eff}) or gain margin.

- STEP 1) As discussed in the evaluation portion (TN Form 3.5-3) of LR 721004-1432, Revision 1, on Page 3 of 12, the original 32PTH1 DSC most reactive configuration was re-evaluated with SCALE Version 6.0 to determine whether there was any bias between the SCALE Version 4.4 results and SCALE Version 6.0 results; the Δk_{eff} was found to be within statistical uncertainty described in Section U.6.4.1 of the UFSAR. Therefore, the calculational differences are within the analysis margin of error and thus considered "essentially the same," as defined in Section B3.4 of NEI 96-07 Revision 1, Appendix B.

This is described in the evaluation portion (TN Form 3.5-3) on Page 3 of 12 as follows:

"A benchmark comparison of the unchanged most reactive case was performed in the analysis to determine if there is any bias between the version 4.4 results and the version 6.0 results." Note that the text "unchanged most reactive case" refers to the original 32PTH1 DSC model documented in the UFSAR.

- STEP 2) As discussed in the evaluation portion (TN Form 3.5-3) of LR 721004-1432, Revision 1, on Page 3 of 12, TN confirmed ability of SCALE Version 6.0 to predict the k_{eff} of the system. The discussion concludes that based on an evaluation of critical experiments, the results predicted from SCALE Version 6.0 are essentially the same as those predicted from SCALE Version 4.4 for the entire range of the method.

Additionally, as indicated in the screening portion (TN Form 3.5-2) of LR 721004-1432, Revision 1, Page 17 of 29, Change #46, there is no adverse impact on criticality safety due to the fuel compartment width dimension increase because, as discussed in UFSAR Section U.6.4.2.B, the most reactive configuration (MRC) is characterized by the minimum fuel compartment tube

internal width. Nevertheless, as Change #46 goes on to say, a full evaluation is performed under 72.48 for this change.

There is sufficient description of the criticality evaluation to conclude that TN is in compliance with Sections B3.4, B3.10, and B4.3.8.1 of NEI 96-07 Revision 1, Appendix B.

Instance 2 - Use of a New Method:

The NRC states that the addition of the new 32PTH1 Type 2-W basket through the 10 CFR 72.48 process resulted in a change from a method described in the FSAR to another method that has not been approved by the NRC for the intended application, specifically, a thermal evaluation using computational fluid dynamics methods used to analyze storage conditions. The Staff noted TN performed evaluations of the HSM-H loaded with the 32PTH1 Type 2 DSC using ANSYS finite element analysis (FEA) code but the evaluation for the new 32PTH1 Type 2-W was based on calculations using a CFD model created in the ANSYS FLUENT code. TN performed a comparison of the 32PTH1 DSC (CoC 1004) to the Advanced NUHOMS® 24PT4 DSC (CoC 1029) using the ANSYS FLUENT code. For the thermal evaluation, there are two cases where TN uses a code or a method that is different from what is in the NUHOMS® 32PTH1 FSAR: (1) a thermal evaluation using ANSYS FEA versus thermal evaluation using FLUENT code, and (2) a method to compare different cask systems under different CoCs (1004 versus 1029).

TN Assessment of the Potential Violation:

As stated earlier, TN uses Regulation 10 CFR 72.48, NRC Regulatory Guide 3.72, and NEI 96-07 Revision 1, Appendix B as the bases for our implementing procedure to carry out the 10 CFR 72.48 process. The NRC states that the use of an approved MOE is a departure because the approval of the use of the MOE in question occurred under a different TN CoC (TN is also the CoC holder and storage system design authority for CoC 1029).

NEI 96-07 Revision 1, Appendix B Section B3.4 indicates that changing from a method described in the FSAR to another method is not a departure from a method of evaluation if that method has been approved by NRC for the intended application. NEI 96-07 Revision 1, Appendix B Section B3.4 goes on to indicate that a new method is "approved by the NRC for the intended application" if it is approved for the type of analysis being conducted and the licensee or CoC holder satisfies applicable terms and conditions for its use. NEI 96-07 Revision 1, Appendix B does not imply that this is limited to a single license, CoC, or amendment application.

The "intended application" in this case is the thermal analysis of a NUHOMS® DSC stored horizontally in a NUHOMS® concrete storage module. All NUHOMS® designs use the same technology, storing fuel horizontally in NUHOMS® dry shielded canisters, inside NUHOMS® horizontal storage modules, after transfer in NUHOMS® transfer casks. The geometries, cooling flowpaths, etc. are all essentially the same between the various NUHOMS® designs. Three different CoCs use the NUHOMS® technology, and, in one case, the CoC 1029 DSCs are transferred in a CoC 1004 transfer cask, which can be used by both CoC 1029 and CoC 1004 general licensees.

In this particular case, the NRC has reviewed and approved the use of the methodology that uses FLUENT in evaluating the thermal performance of the 24PT4 DSC in the AHSM in CoC 1029. TN is using the NRC-approved MOE to evaluate a different basket for the 32PTH1 DSC in the HSM-H in CoC 1004 in the exact same manner used to evaluate the 24PT4 DSC in the AHSM in CoC 1029. This simply involves modeling the modified basket in the approved computer code. The SER and RAIs for licensing the 24PT4 DSC in an AHSM in CoC 1029 were reviewed and no

restrictions were found for the methodology that uses the FLUENT Code. The specific CoC number is inconsequential to applying the 10 CFR 72.48 process and determining if the method is approved for the type of analysis being conducted, and whether applicable terms, conditions, and limitations for its use are satisfied. The 10 CFR 72.48 evaluation demonstrates that the previously approved MOE is used for the approved and intended application.

Based on this discussion, it is concluded that the change is in compliance with NEI 96-07 Revision 1, Appendix B Section B3.4, in that the method has been approved by NRC for the intended application (it is approved for the type of analysis being conducted) and TN's use is consistent with that approval and satisfies the applicable terms and conditions for its use.

Additionally, TN has thoroughly reviewed 10 CFR 72.48, NRC Regulatory Guide 3.72, and NEI 96-07 Revision 1, Appendix B to review language regarding the use of methods from different CoCs or different CoC amendments within the same CoC. We found that the language in many instances strongly implies that such methods may be considered.

For example:

- NEI 96-07 Revision 1, Appendix B Section B3.4, page 16, includes the phrase "changing from a method described in the FSAR to another method."
- NEI 96-07 Revision 1, Appendix B Section B3.4, page 17, includes the phrase "a licensee may also adopt completely new methodology."
- NEI 96-07 Revision 1, Appendix B Section B3.10, page 23, includes the phrase "replacement of existing methods of evaluation with alternative methodologies."
- NEI 96-07 Revision 1, Appendix B Section B4.2.1.3, page 41, includes the phrase "use of new or revised methods of evaluation," and "use of an alternative method," and (page 42) "Proposed use of an alternative method."
- NEI 96-07 Revision 1, Appendix B Section B4.3.8, page 67, includes the phrase "licensees or cask certificate holders can also use different methods," and "Use of new or different methods of evaluation," and "Use of a new NRC-approved methodology," and (page 68) "adopting an entirely new method of evaluation."
- NEI 96-07 Revision 1, Appendix B Section B4.3.8.2, page 70, includes the phrase "Changing from One Method of Evaluation to Another," and "from one method of evaluation to another," and (page 72) "application of a different method," and (page 73) "application of the new methodology."
- NEI 96-07 Revision 1, Appendix B Section B4.3.8.2, page 71, includes the sentence "A new method is approved by the NRC for intended application if it is approved for the type of analysis being conducted, and applicable terms, conditions, and limitations for its use are satisfied."
- NEI 96-07 Revision 1, Appendix B Section B4.3.8.2, page 73, includes the question "Is the ISFSI facility or cask design for which the methodology has been approved designed and operated in the same manner as the ISFSI facility or cask design to which the methodology is to be applied?"

- NEI 96-07 Revision 1, Appendix B Section B4.3.8.2, page 74, includes the statements "Differences in the ISFSI or cask design configurations and licensing bases could invalidate the application of a particular methodology," and "The existence of these differences does not preclude application of a new methodology to an ISFSI facility or cask design."

While the statements in the bullets above may seem redundant, the preponderance of such statements is key. It is not clear from where the other methods would come, but from a different CoC or different CoC amendment (to a given CoC). TN does not feel that these excerpts have been taken out of context to support this position.

Also, these statements are not necessarily related to scenarios that would need prior NRC review and approval or not need prior NRC review and approval. They are provided solely for the purpose of making the point that this evidence supports that methods from a different CoC or different CoC amendment can be considered.

Where NEI 96-07 Revision 1, Appendix B could be interpreted as limiting the use of a method more narrowly, the language is actually qualified such that it cannot be taken to limit approval solely to a specific CoC or CoC amendment.

For example:

- NEI 96-07 Revision 1, Appendix B Section B4.2.1, page 42, "...limitations associated with the use of a method, e.g., identified in a topical report and/or SER" [emphasis added]
- NEI 96-07 Revision 1, Appendix B Section B4.3.8.2, page 74. "...NRC approval would typically be part of an ISFSI or cask design's licensing basis and limited to a given ISFSI or spent fuel storage cask design..." [emphasis added]

Additionally, TN has cask designs that are carried forward unchanged from one CoC amendment and associated FSAR revision to the next. For example, a recent CoC amendment involving simply changing from a custom format to the NUREG-1745 standard format for our Technical Specifications (TS) carried nearly all system designs forward, with no analyses performed and no MOE changes included for those designs in the associated FSAR revision. In that case, the CoC was amended and FSAR revised but the design and analyses for nearly all designs were not affected. It would not seem reasonable to lose the ability to consider those methods approved during earlier amendments simply because we took the proactive step of implementing the improved TS format.

TN and others in the industry have also routinely cross-referenced FSAR analyses from a cask design approved by the NRC under one CoC to a cask design approved by the NRC under another CoC for the same component or system design. As discussed earlier, these designs are all related to the same technology. It would not seem reasonable to lose the ability to consider methods associated with those analyses in considering changes to that basic technology simply because they exist in a different CoC or CoC amendment.

NRC's stated position is contrary to the practice that has been followed by the industry. Implementation of 10 CFR 72.48 in the industry has been previously inspected by NRC staff and no issues were identified.

Generic Industry Implication:

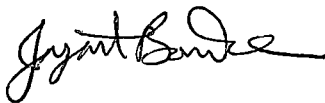
TN is aware that the subject of using an MOE which was approved in the licensing of a different CoC or a different CoC amendment is part of the ongoing discussions between NRC and the industry in NRC's review of NEI 12-04, which is the revised guideline for implementing 10 CFR 72.48. TN is also aware that this has not yet been resolved and therefore is not yet reflected, one way or the other, in any revised NRC-endorsed guidance for 10 CFR 72.48 implementation. On the contrary, objective evidence from NEI 96-07 Revision 1, Appendix B is provided in the assessments which support the use of such methods of evaluation.

Conclusion:

TN is in compliance with NEI 96-07 Revision 1, Appendix B, Sections B3.4, B3.10, and B4.3.8, which is endorsed by NRC for complying with the provisions of 10 CFR 72.48 and therefore the changes addressed in this 72.48 evaluation are consistent with 10 CFR 72.48 and do not result in a departure from a method of evaluation in either of these instances.

Should NRC staff have any questions or require additional information, please contact Don Shaw by telephone at 410-910-6878, or by e-mail at Don.Shaw@areva.com.

Sincerely,



Jayant Bondre
Vice President and Chief Technical Officer

cc: Raynard Wharton, U.S. Nuclear Regulatory Commission
Kamran Tavassoli, TN
Craig Prothero, TN
Dwight Dillard, TN