NRC STAFF COMMENTS ON NEI 12-04, "GUIDELINES FOR 10 CFR 72.48 IMPLEMENTATION," APPENDIX B, "EXAMPLES OF 72.48 REVIEWS OF REALISTIC ACTIVITIES"

General Comment Regarding Appendix B:

The calculations to support a 72.48 evaluation should be as rigorous as the calculations used to support the original analysis and address all areas of the system design and evaluation that may be impacted by the proposed change. The analysis should include all uncertainties, margins, ranges of applicability, and any changes to those resulting from the proposed activities.

Example 1 – Change in Structural Analysis

The example and its variants should clarify that the comparison of MOEs described in the example includes consideration of the effects of the two methods' uncertainties and the assumptions, margins and so on that are built into the methods. Additionally, the example and its variants should be modified to account for the staff's position on approval of MOEs that was provided in Enclosure 1 to the NRC's second interim response letter (ML14349A318). Third, the example should address considerations of how a change in codes, and thus a change in results, may have an impact on whether or not other changes may be necessary. For example, changes to results that are the basis for: 1) technical specifications (e.g., drop height limits, or temperature restrictions for cask movements), or 2) methods for performing or controlling a design function could mean a change is needed to those as well. At least, as the example is currently presented, it is not clear that some of the related applicability and screening questions can be answered 'no.'

The parenthetical statement near the beginning of the Variant 1 description should be clarified to explain whether or not the statement also includes MOE versions with a change to a MOE element that are fundamental or significant in determining the use of the new version to be a substitution of a different MOE. The explanation should include the basis for the statements regarding this point. In a similar vein, the Variant 1 description and evaluation should include a discussion about identifying differences in the MOE elements from the one code version to the new version, similar to what is done for Variant 2. Both variants appear to relate to the same aspect of departures from a MOE (i.e., changes to the MOE elements).

Discussions, such as are in Variant 1, regarding conservatism and accuracy should be modified to correctly use these terms. Conservatism and accuracy are not synonymous. For example, the elements of one method may introduce more conservatism (vs. the elements in another method) but not necessarily make the method more accurate than the other method. Further, the discussion in Variant 1 appears to be more about precision than either accuracy or conservatism.

The Variant 1 description includes a comparison of benchmark results for the two computer code versions. An explanation of the cause of differences in results is also given, but it should be augmented, particularly for the one case where the differences are not identified to be within the codes' analytical tolerance. The discussion should address items such as how the sources of the difference (the use of different user options) could be or were resolved. For example, whether or not the two code versions have the same selectable options and could be or were rerun using the same options. This kind of information may have bearing on the conclusion for the variant.

In addition to code verification, the variants for this example should include a discussion of code validation. The conclusion that new codes or versions of codes are 'conservative' or 'essentially the same' (vs. the codes or code versions in the FSAR analysis) should be based on a validation of the codes or code versions that demonstrates that this conclusion is consistently true over the range of parameters considered for the safety analysis and that adequately covers the range of the codes' use.

Comparisons of different codes and code versions in the example and its variants should be complete and include pertinent information. For example, the comparison in Variant 2 should clarify that the limitations of code DELTA do not preclude it from doing what code ALPHA can do over the same range of intended use. Further, the consideration of dose conversion factors seems to be irrelevant to the comparison because the example is for two structural codes.

The discussion of Variant 3 should address the screening of the proposed change versus the questions related to 72.48 criteria (i) though (vi). The variant appears to only focus on screening relative to changes to MOEs. For completeness, the discussion should address all the screening and evaluation criteria.

Finally, the text of the example and its variants should be checked for editorial changes that are needed to ensure clear understanding of the activity description, evaluation points, and logic flow. For example, Variant 2 describes a step to look at whether or not the two codes are the same method (with updates to elements). Later the variant describes how to determine if the results of the new code are conservative or essentially the same as those from the code in the FSAR. This second determination would only be done once the licensee or CoC holder determined the methods are the same. The current description does not clearly make this connection. The staff also identified a number of other minor editorial errors.

<u>Example 2 – Reduction in Size of Transfer Cask</u>

The example needs to:

a. provide a more complete description of the proposed activity, the approved licensing basis, and technical aspects of the proposed activity;
b. provide a more complete evaluation of the technical aspects of the proposed activity at each stage of the evaluation (Applicability, Screening, Evaluation) process;
c. ensure consistent use of terminology between the description and evaluation of the proposed activity and the approved licensing basis;
d. account for NRC positions and findings that were made as part of real life cases related to this example; and
e. modify the responses and conclusions for the evaluation process questions (Applicability, Screening, and Evaluation questions) and the overall example conclusions, as necessary.

The example's descriptions and evaluations of the proposed activity and the approved licensing basis, including their technical aspects, appear to be incomplete. It is not clear whether or not the proposed activity involves changes beyond those explicitly described in the text. The descriptions of the proposed activity and the approved licensing basis and the evaluations appear to include various assumptions, which are not described in the example. Important technical considerations appear to be left out as well. Thus, it is not clear that the responses to the questions addressed in the evaluation process are adequately supported or are correct.

Some conclusions seem to be made prematurely in the process as well. The following discussion describes specific examples that illustrate these points.

The NRC recognizes that the example is similar to an actual case where changes were attempted within the provisions of 72.48 that, upon further review and NRC involvement, resulted in an exemption request and an amendment to a cask CoC. In those cases, the proposed activity included changes in addition to those explicitly described in the example, including drain down of the canister cavity water as the transfer cask (TC) exited the spent fuel pool. The discussion in the example implies the canister may be drained. It is also not clear from the example whether or not other aspects of the cask operations, such as presence of neutron shielding, are changed as part of the proposed activity.

The description of the approved licensing basis does not address each aspect of the proposed activity as it may or may not be addressed by each part of the cask's approved licensing basis. For example, crane and/or lift height requirements are often included in the CoC or technical specifications (TS). Further, it is not clear that the CoC and TS lack a description of the TC and its components. There is also no description in the example of what may or may not have been in the cask's SAR and the NRC's SER regarding the shielding analysis and the NRC's review relying on integral lead shielding for the design to be acceptable. Nor is there any discussion of what the NRC's SER does or does not address in terms of any part of the proposed activity.

The responses to the questions in the example do not account for all configurations of the cask during cask operations in terms of identifying and evaluating possible accidents and malfunctions (new or currently analyzed) and their consequences. They also do not address the thermal impacts of the proposed activity for the various configurations. The configurations include the TC outside of the pool and supplemental shielding, the TC in supplemental shielding in the preparation area or on the transfer trailer, and the TC in some supplemental shielding with other pieces moving around and above the TC. Water, or no water, in the cavity in some cases versus others may add other configurations both with the TC inside or outside of supplemental shielding. Configurations where the TC is handled with significantly reduced shielding represent a change to the UFSAR-described design functions and methods for performing a design function. For these configurations, if the proposed activity is similar to the real-life case, TC movement is done remotely with personnel in a separate area or room to account for the absence of shielding. Given how the equipment is relied upon (in place of shielding), for remote operation, it may be an SSC important to safety, and thus its potential malfunctions may need to be considered and evaluated. This type of scenario may affect the likelihood of a TC drop due to the potentially more limited ability of personnel to notice warning signs of crane problems. The movement from the pool to the preparation area is done with the canister lid not secured to the canister (only resting on the canister), a possible consideration for increased consequences of an accident or a different accident. Movements of heavy objects (the shield bell and trailer shielding) over the TC now would also be done remotely. The placement of supplemental shielding around the TC could negatively impact the TC's thermal performance, potentially affecting temperatures, in turn leading to possible impacts on fission product barrier limits.

While Part 50 requirements and programs have a role in the operations affected by the proposed activity, the example should be written to be consistent with how Part 72 requirements also apply. As indicated in relation to the CoC amendment for a similar case, the NRC clarified that the requirements of 72.104 and 72.106 apply to the TC operations whether they occur inside or outside of the Part 50 facility. Additionally, heavy load control programs are mainly

concerned with damage to the facility, whereas damage to the TC needs to be considered for the 72.48 evaluation.

Other statements or lack thereof have implications that are not necessarily correct. The licensing basis statement about the FSAR describing the use of supplemental shielding is one example. As this kind of shielding is described in FSARs, it includes items such as lead blankets that are used for ALARA purposes and not for purposes of that which is called supplemental shielding in the example (to enable personnel to be near the TC at all and replace integral shielding that has been removed). It is not clear that a 'yes' response to third screening question means only the 72.48(c)(2)(viii) criterion applies in the evaluation part of the process; the activity may have a 'yes' response to other screening questions, which means the other 72.48 criteria also apply. While it is true that the limits in Part 20 and 72.104 cannot be exceeded, the same is true for 72.106; thus, the statement about Part 20 and 72.104 does not add any support to the conclusion for the third evaluation question[1]. The response to the 72.48(c)(2)(viii) question implies that if the evaluation method details were unchanged, the response for activity 2 would be 'no.' However, this does not appear to consider that the method, even if unchanged, may be inappropriate for the design change.

Thus, many of the responses to the questions for the Applicability, Screening, and Evaluation parts of the process are not supported by the information provided in the example and, with more complete information and evaluation, may not be correct.

The usefulness of Variant 1 is limited and unclear. This is due to both the limited description of the variant's evaluation, resulting in the lack of some useful information, and the nature of the variant. The description should address how the responses to the Applicability, Screening, and Evaluation questions would change versus the responses for the main example. Further, regardless of whether or not a cask CoC, including the technical specifications, specifically requires a radiation protection program (RPP) or conformance with a licensee's Part 50 RPP. A licensee would be required to conform with its Part 50 RPP anyway because the regulations governing Part 50 licensees require it. Including such a condition in the CoC emphasizes the need for compliance with that requirement and most often include specific conditions that must also be followed in cask operations. Thus, the variant does not fulfill its purpose, as stated in the statement just preceding the variant's description. Changes to the variant should also account for changes made to the main example in response to NRC comments, as applicable.

Example 3 – Removal of Helium Leak Test of Canister Fabrication Welds

The example applies to 10 CFR Part 72 change activities; therefore it is not clear why the FSAR subheading mentions the Part 71 containment boundary. A reference to Spent Fuel Management Interim Staff Guidance (ISG) -25, "Pressure and Helium Leakage Testing of the Confinement Boundary of Spent Fuel Dry Storage Systems," should be added to the example, because although it is not a regulatory requirement, it provides guidance to demonstrate that the confinement system meets its design basis. This ISG has been incorporated into NUREG-1536, "Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility," Revision 1. Additional applicable regulations not cited from ISG-25 in Example 3 include: 10 CFR 72.122(l), 72.232(b), 72.236(d), 72.236(j), and 72.236(m). The NRC is not aware of any equivalent methodology that could replace the helium leak test. The comments in each of the two paragraphs below need to be considered in the responses to the screening and

[1] This comment applies to similar statements made in other places in the guidance, such as in Section 6.3.

evaluation questions. In addition, the answer to each question would need to be changed from "no" to "yes," unless the current responses can be justified.

The following comments are for the 72.48 screening responses. For the second screening question response, clarify how the answer to the question is "no" since confinement is a design function. For the fourth response, clarify how removal of the helium leak rate test is consistent with descriptions in the UFSAR. Because the shop fabrication helium leakage test is performed before each cask is placed into service that does not mean the test is not relied upon for meeting dose limits and maintaining an inert environment.

The following comments are for the 72.48 evaluation question responses. For the first response, eliminating the helium leak rate test could result in an undetected leak. However, the FSAR did not analyze accidents involving undetected leaks. Therefore, the answer to question 1 is still 'No,' but not for the reasons stated in the example response. For the fifth response, if the leakage of the confinement boundary accident condition is considered non-credible when leak rate testing is performed, when leak rate testing is eliminated, leakage of the confinement boundary could lead to an accident of a different type. For the seventh response, one purpose of the helium leak rate test of the entire confinement boundary is to verify that a helium environment is maintained. Failure to maintain the helium environment could, for example, result in an increase in cladding temperature, which could result in exceeding that design basis limit or others. In addition, independent of the answer to each screening question, each 72.48 evaluation question must be answered. This is not indicated by the sentence, "In this case, only Screening question 1 was answered 'yes', therefore, only evaluation questions 72.48(c)(2)(i-vii) are applicable."

The Variant to Example 3 needs to be clarified to be consistent with ISG-25, regarding the fabrication facility performance of the helium leak test to demonstrate a dry storage system confinement boundary leak rate is within the design limits. It has not been established that there is another test or examination that has the sensitivity of the helium leak rate test. The SER is intended to only confirm or modify the conclusions in the SAR regarding events and their consequences being within regulatory bounds. Therefore, because a topic is not mentioned in the SER does not mean the NRC does not rely upon it. Since there are no other alternatives to the helium leak rate test, it is not clear that this Variant is useful. Modify the Variant to address more realistic changes.

<u>Example 4 – Change in Criticality Analysis Code</u>

Revise the text under "NRC-Approved Licensing Basis" to address the following:

- The SER would typically include cross section library information, a brief description of the code and code version, and a discussion of why the use of the code version and cross section library is acceptable.

- Under "FSAR," it is not clear what is meant by "mechanical and depletion uncertainties."

Additionally, revise the response to question 8 of the 72.48 evaluation response, second bullet, to address area of applicability. Specifically, this response should clarify that "Results are conservative relative to the previous results if they are closer to design bases limits or safety analyses limits," provided the new results are determined to be within the range of applicability of the new method.

Variant 1 of this example should be revised to be consistent with NRC staff's interpretation of Method of Evaluation approvals, as discussed in Enclosure 1 to the second interim response letter dated December 11, 2014. Specifically, the CoC holder wishing to use a different criticality analysis method would need to determine:

(1) whether the MOE is approved for the type of analysis being conducted,
(2) whether the MOE is generically approved for use at this type of facility, and
(3) whether all terms and conditions for use of the MOE are satisfied.

MOE approvals, including terms and conditions for use, are captured in regulatory guides that approve topical reports for MOEs. MOEs in SARs for cask CoCs and ISFSI licenses are not considered as generically approved. Variant 2 of this example should be revised to state that the change described may have effects on the thermal, structural, materials, confinement, or shielding evaluations, which would also have to be considered in this 72.48 evaluation. Additionally, for the criticality analysis, the CoC Holder would need to demonstrate that the revised cell basket wall thickness does not result in the system being outside the range of applicability of the method, and that it does not result in a higher code bias based on a trending analysis.

Example 5 –Reduction in Diameter of Concrete Overpack

A vented concrete overpack for a storage cask does not provide "confinement". The staff suggests removing the word "confinement" from the example where it appears in the example text.

By reducing the overpack diameter, the thermal mass is reduced, and hence without performing thermal analysis it cannot be concluded that it will not increase the temperatures, especially for a fire accident scenario. Similarly reduction in overall diameter will create an unanalyzed scenario for the non-mechanistic cask tip-over accident. Hence structural analyses need to be revisited.

Further detail is needed to support and justify that the example does not involve a change to a MOE for the shielding analysis. The example portrays the change in the design basis fuel as only a change in input parameters. However, the example involves a change to how the design basis fuel is selected for the analysis. Specifically, it is a change from the use of a hypothetical burnup and cooling time combination that bounds all the approved cask contents (i.e., spent fuel) to the use of a burnup and cooling time combination(s) that reflects the limiting combinations for the cask's approved contents. This would be a change to an element of a MOE, regardless of whether or not the SER addresses it. It should be noted that the CoC dose rate limits are derived from the FSAR shielding analysis that was based on the hypothetical burnup and cooling time combination, which would be described in the SER. Given these considerations, responses to the screening and evaluation questions regarding MOE or that are contingent upon the MOE that was used would need to be changed (e.g., screening questions 1 and 3 and evaluation question 3). Evaluation question 8 would also need to be addressed, considering that the change to the MOE results in margin gain. Revise the example to incorporate all of these points.

A change in method (MOE) has occurred; therefore, revise the responses to all eight (i.e., 72.48 (c)(2)(i through viii)) NEI 6.0 criteria, to determine whether an amendment is required or not.

For Variant 1, revise responses to all the applicable screening and evaluation steps to reflect the revision to the Main example as stated above.

Example 6 – Installation of an Enclosure Structure Over the Casks

The basis for determining that the activity in this example does not involve a change to a MOE is unclear. It would seem that addressing the effects of an enclosure in the thermal analysis would be an element of the thermal MOE. In this example, the current MOE in the FSAR does not include this element; so, the element is being added to the MOE. The nature of the activity in this example seems to be very similar to Activity No. 2 in Example 2 (as that example is currently written). In that example, the activity was determined to involve a change to a MOE. Given the similarity of that example to this one (i.e., Example 6), Example 6 also appears to involve a change to a MOE and should be modified to evaluate this change.

The licensing basis discussion is missing some key points or makes assumptions that are not appropriate. The example should be modified to address these points and correct these assumptions. First, silence regarding an enclosure surrounding the ISFSI in the licensing basis documents (the license, technical specifications, FSAR, and staff's SER) does not mean that addition of such a structure to the ISFSI is within the limits of the license (or its approval). A similar assumption was made as part of an inappropriate use of 72.48 to change a transfer cask and add new, supplemental features or hardware (the NUHOMS lightweight transfer cask). NRC findings related to that 72.48 and the licensing activities (e.g., CoC changes made per an amendment - Amendment 11) that followed have relevance to this example. Were a surrounding structure an option to or part of the design for the ISFSI facility, the licensing basis documents would have addressed it. Lack of a description of such a structure in the license, which describes the facility and not just the casks at the facility, means the casks are stored in the ambient environment. Also, adding an enclosure structure to the ISFSI design would mean that the requirements in 10 CFR 72.122(b)(ii) would now apply and compliance would need to be evaluated. Therefore, it is not clear that 'no' is the appropriate answer to applicability question number three (NEI 4.0.3).

The licensing basis discussion relating to the temperature limit basis should include details regarding how the limit was derived (i.e., the limit's basis), including the configuration in the FSAR analysis from which the limit was derived.

The responses to the 72.48 evaluation questions do not appear to adequately consider the potential impacts of adding a structure that encloses the ISFSI. In particular, the impacts related to likelihood and consequences of accidents already analyzed in the FSAR and the possibility for accidents of a different type than what are analyzed in the FSAR. For example, the presence of the structure means that there are additional facility features (e.g., doors on the structure) and operations involved in the movement of casks to and from the ISFSI pad. This could lead to incidents that increase the likelihood of cask drops. It is also not clear that the effects of the structure's collapse are adequately considered. Also note that whether or not another accident is bounded by one already analyzed in the FSAR is not pertinent to the question of whether or not a change results in the possibility of an accident of a different type. Variant 2 to the example provides two reasons for why prior NRC review and approval would be needed for the variant's scenario. These reasons also seem to apply to the main example. Thus, the main example should be written to address the same items, justifying or explaining why they are or are not applicable.