

Disposition Table for NEI and EPRI Comments

Draft Safety Evaluations for EPRI Depletion TRs 3002010613 and 3002010614

Technical and editorial comments are listed in Table A-2-1 and Table A-2-2, respectively.

Table A-2-1: Technical comments on Draft SER, Revision 2

Page #	Line #	Comments	Staff Disposition
3	48	The Kopp memo interpretation in the ISG only includes uncertainty in the isotopic content as stated in item <i>i</i> (line 30-33). The reported bias and uncertainties in the EPRI depletion benchmarks cover not only isotopics but also the cross sections, numerical approximations, etc. The comment in the SER acknowledges this fact; however, it is not reflected in the main text of the draft SER. To avoid confusion for future applicants and reviewers, we recommend this point be clarified in the text.	<p>The language in the SER was removed because it was related to <i>criticality code cross-section uncertainty</i> (part of criticality code validation), which is a separate and different topic from cross-section related uncertainties present during depletion calculations. The comment on the language removal is focused on <i>criticality code</i> validation considerations.</p> <p>The NRC believes that the existing SER language already includes what is being asked to be added:</p> <p><i>In DSS-ISG-2010-01, it states that the NRC staff should interpret depletion uncertainty as “the uncertainty in the isotopic number densities generated during the depletion simulations.” The</i></p>

uncertainty in the isotopic number densities can arise from uncertainty associated with the depletion code (i.e., based on chosen models and methods) and the underlying nuclear data used by the depletion code – this also includes how the nuclear data is implemented by the depletion code. Both of these uncertainty components can have a significant impact on the isotopic number densities output by the depletion code.

The bold text already acknowledges that the EPRI benchmarks account for cross-section related uncertainties present during depletion calculations.

Footnote 8 also already includes the requested language:

This k-infinity change represents a means to estimate the net effect of all sources of depletion code

			<p><i>uncertainty – for example, uncertainty introduced by nuclear data, manufacturing tolerances, thermal hydraulic conditions, etc. – as long as measurement uncertainties are properly accounted for or shown to be insignificant.</i></p>
10	47-49	<p>The following text, “<i>additional study may be warranted for other fuel designs over a range of BA types and loadings,</i>” might be confusing to an applicant as it could be interpreted as a requirement for additional analysis by the applicant to demonstrate applicability for all PWR fuel types. The next page acknowledge that these issues were addressed via RAI responses and the applicability was demonstrated. Therefore, we recommend clarifying the original text to avoid confusion. One option could be to re-state this item in a way that the SER clearly states that this concern was raised during the NRC review and addressed by EPRI and described in the following section?</p>	<p>When using an approved topical report, all limitations and conditions (L&C) must be addressed by licensees. In this case, L&C 1 provides the necessary clarification. The NRC does not see any disconnect from the discussion in question and L&C 1.</p> <p>The SER also quotes the utilization report RAI 7 response clarifying analysts’ responsibility, which the NRC agrees with:</p> <p><i>The General Response to [the EPRI utilization report] RAIs provides a similarity analysis to a range of rack and fuel designs and shows excellent agreement with non-flux trap racks designs and good agreement with flux trap designs with low burnup fuel. The criticality safety analyst can rely on the similarity</i></p>

			<p>analysis given in the general response and only needs to do further analysis if the rack or fuel is significantly different than current racks and fuel. If there is a new rack or fuel design significantly different [than] the current generation racks or fuels then the analyst should confirm similarity or use alternate methods to establish a bias and uncertainty for burned fuel in the spent fuel rack.</p>
13	28-30	<p><i>"For other fuel types, BAs, or other SFP storage conditions additional analysis may be needed to demonstrate that results of the EPRI benchmark report are applicable to a given application."</i></p> <p>Same as the previous comment. The statement is vague and open ended, which could lead to confusion and delay on the part of applicants and reviewers thinking that additional analysis is needed for current designs. If the goal is to include considerations for any future potential exotic designs and ensure exclusions of those exotic designs, perhaps that should be clearly stated? Instead of stating <i>"For other fuel types, ..."</i> perhaps should state <i>"For any other future, non-standard, exotic fuel types, ..."</i>.</p>	<p>This comment is handled by L&C 1. Regardless of the phrasing, the licensee is responsible for stating why the approved methodology is applicable to their fuel (i.e., in scope). Based on the deviation from the "norm", the NRC reviewer will need to make a judgment call on whether the licensee's justification is adequate or not and whether or not additional analysis is needed. Bottom-line: Some judgment calls will be needed by both the licensee and the NRC reviewer. If the wording is changed to the proposed, ambiguity still remains anyhow.</p>

			That is, how to interpret “non-standard” and “exotic”?
18	26-27	Table 1 should be replaced with the agreed-upon changes, specifically, with the Table included in the letter. Based on the agreements during December 20, 2018 public meeting, EPRI is providing this table to the NRC as part of this package, as Attachment 1. It is recommended to remove confirmatory NRC/PNNL Bias and Uncertainty from Table 1 of draft SER-Rev2 to avoid confusion by the applicant given Appendix C was only for confirmatory purposes and new bias is for additional NRC safety margins. Also recommending to address uncertainty and bias for the values that are between the values listed in Table. For that purpose, suggest adding a statement similar to “ <i>Linear interpolation between the burnup values, listed in Table 1, is acceptable to calculate the corresponding EPRI uncertainty and additional NRC bias for specific fuel assembly burnups</i> ” to avoid ambiguity for the user.	All suggestions have been incorporated.
19	17-24	Based on the discussions during the December 20, 2018 public meeting and to avoid confusion, recommend deleting this paragraph.	The paragraph was kept. The staff has determined that it provides context for Appendix C. Editorially it was moved up a few paragraphs to better fit with the narrative.

19	26-31	<p>Based on the discussions during the December 20, 2018 public meeting and to avoid any confusion, it is recommended to delete <i>"Specifically, the net effect of EPRI-derived biases and uncertainties were found to be slightly non-conservative at higher burnups exceeding approximately 30 GWd/MTU."</i></p> <p>If NRC plans to keep Appendix C, this whole paragraph can be reworded to state that NRC staff performed a confirmatory analysis, as presented in Appendix C, and additional discussions with EPRI were conducted (ML number for public meeting) to further discuss the reasons behind the observed discrepancies. Based on these discussions, NRC added additional safety margins for the Bias calculations, as shown in Table 1.</p>	<p>The whole paragraph was deleted.</p> <p>This was the basis for keeping the paragraph in question in the preceding comment. Discussion has been added in the paragraph directly preceding Table 1.</p>
20	3--5	<p>Given the new agreed upon numbers, suggest adding the NRC bias in this item. Note the text states 430 GWD (typo), which should be changed to 30.</p>	<p>This text was updated to fit with preceding changes.</p>
20	11--14	<p>Similar to first comment, SER needs to spell out that bias and uncertainty values cover not only isotopic but cross sections, etc.</p>	<p>See NRC response to the first comment.</p>
20	26	<p>Given the revised numbers and plans for utilization report revisions, the last sentence should be changed to reflect the change. "There is no need for an end user to account for this bias..." is not true anymore.</p>	<p>This text was updated to fit with preceding changes.</p>
23	41--46	<p>Based on the agreed numbers from the December 20, 2018 public meeting and revised Table 1, this paragraph should be deleted or updated to reflect these changes. ;</p>	<p>This text was updated to fit with preceding changes.</p>
Appendix A-C		<p>Not sure of the purpose of Appendix A and B. If Appendix C is going to be included in the final SER, we recommend revising the chosen example based on the discussions from the December 20, 2018 public meeting. The observations should be revised to reflect the agreed upon changes. Need to make clear that Appendix C is for confirmatory purposes and not for applicant use.</p>	<p>The purpose of Appendices A and B are to document the NRC's confirmatory analysis of EPRI's statistical analysis and was originally requested to be included by NEI. The Appendices support NRC</p>

			<p>review conclusions in the SER body. I.e., they are inherently regulatory review tools, not guidance or modifications to the methods being reviewed.</p> <p>Licensees who adopt topical reports into their licensing bases generally understand the mechanics of using them in licensing applications. I.e., L&Cs are used to clarify or modify how the approved methods are to be used. In this case the L&Cs make no mention of the Appendices, therefore there should be no confusion as to whether or not a licensee should use them.</p> <p>Nonetheless, the requested clarification was added in Footnote 20.</p>
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Table A-2-2: Editorial comments on Draft SER, Revision 2

Page #	Line #	Comments	Staff Disposition
1	10	Suggest revising "(McCullum, 2013)" to "NEI, 2013"	All suggestions have been incorporated.
2	6	Suggest revising "(Smith et al., 2011; Smith et al., 2017)" to "(EPRI 2011, EPRI 2017)"	All suggestions have been incorporated.
2	10	Suggest revising "(Akkurt and Cummings 2018)" to "(EPRI 2018)"	All suggestions have been incorporated.
3	5	Suggest revising "(Smith et al., 2017; Akkurt and Cummings, 20172018)" to "(EPRI 2017, EPRI 2018)"	All suggestions have been incorporated.
20	38	Suggest revising "(Akkurt and Cummings, 2018)" to "(EPRI 2018)"	All suggestions have been incorporated.
24	38-40	Per EPRI guidelines, citation should be changed to: EPRI, 2018, <i>Utilization of the EPRI Depletion Benchmarks for Burnup Credit Validation – Revision 1</i> . EPRI, Palo Alto, CA: 2018. 3002010614. ADAMS Accession No. ML18088B395.	All suggestions have been incorporated.
26	35-37	Per EPRI guidelines, citation should be changed to: EPRI, 2011, <i>Benchmarks for Quantifying Fuel Reactivity Depletion Uncertainty</i> . EPRI, Palo Alto, CA: 2011. 1022909. ADAMS Accession No. ML12165A457.	All suggestions have been incorporated.
27	1--3	Per EPRI guidelines, citation should be changed to: EPRI, 2017, <i>Benchmarks for Quantifying Fuel Reactivity Depletion Uncertainty— Revision 1</i> . EPRI, Palo Alto, CA: 2017. 3002010613. ADAMS Accession No. ML18088B397.	All suggestions have been incorporated.