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Dr. Mirela Gavrilas
Director, Division of Reactor Safety Systems
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Industry Review of the NRC Draft Comment Disposition Table

Project Number: 689

Dear Dr. Gavrilas:

On behalf of the Nuclear Energy Institute's (NEI)[1] members, I would like to extend our appreciation for your March 15, 2019 letter which provided a draft comment disposition table on the updated U.S. Nuclear Regulatory Commission (NRC) draft Safety Evaluation Report (SER) for the Electric Power Research Institute (EPRI) reports. When approved, the reports will provide regulatory guidance that may be used by the industry to perform criticality analyses for the storage of spent fuel at light water power plants. NEI and EPRI have reviewed the draft comment resolution table and believe the proposed revisions address most of the industry's concerns with one exception. Footnote 8 of the draft SER states:

> "This k-infinity change represents a means to estimate all sources of depletion code 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."

The statement is not completely accurate since it refers only to the depletion code uncertainty. The EPRI benchmarks account for both depletion and criticality code uncertainty related to the calculation of the reactivity decrement of depletion. For example, using the same fuel isotopic content from a depletion code, if criticality calculations are performed using two different criticality codes or different cross section sets, different EPRI benchmark bias results will be obtained. Using the EPRI benchmarks, this difference in bias resulting only from the difference between the criticality codes will be captured.

[1] The Nuclear Energy Institute (NEI) is responsible for establishing unified policy on behalf of its members relating to matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect and engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations involved in the nuclear energy industry.

This point can be illustrated using the analysis presented in Reference 1[2]. Specifically, the case presented in Figure 1 of Reference 1 uses the PARAGON lattice code with ENDF/B-VII for depletion calculations. Criticality calculations were performed using Scale 5.1 versus SCALE 6.1 (KENO Monte Carlo code) using the same set of nuclides and number densities. The results shown in Figure 1, of Reference 1, clearly illustrate that when different codes/cross sections are used, the depletion bias results are different. The analysis in Reference 1 uses the original EPRI benchmark uncertainty results that are independent of burnup, however, a similar conclusion is found when using the revised uncertainty results. Therefore, the EPRI benchmark utilization process includes more than just the nuclide concentration and depletion uncertainty. It includes depletion and criticality code uncertainty and the SER text should clearly state this to avoid any confusion.

Accordingly, we recommend changing the sentence in footnote 8 with the suggested revisions in red:

> "This k-infinity change represents a means to estimate all sources of depletion and criticality code uncertainty related to the calculation of the reactivity decrement of depletion – 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."

Thank you for your continued attention on this important matter. We look forward to the NRC's final SE in the third quarter of fiscal year 2019. Given the long history of this issue, continued communication is beneficial to ensure that we achieve our mutual goal in having an SER that is both clear and usable. Please contact me if you have any questions or require additional information.

Sincerely,

Nima Ashkeboussi

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[2] V. Kucukboyaci, "EPRI depletion Benchmark calculations using PARAGON," Annals of Nuclear Energy, 81, 1-5, 2015. https://doi.org/10.1016/j.anucene.2015.03.010