Feedback on neutron capture cross-section of ^{133}Cs from analysis of measured inventories of ^{133}Cs and ^{134}Cs of UO$_2$ fuel irradiated in TMI Unit 1/TMI 1 号炉において照射された UO$_2$ 燃料の^{133}Cs 及び^{134}Cs の核種組成測定値の解析から得られた^{133}Cs の中性子捕獲断面積の知見

Thursday, 14 November 2024 16:00 (2 hours)

Nuclide inventory calculations with MVP-BURN and JENDL-4.0 were performed for the twelve fuel samples taken from two 15×15 PWR fuel assemblies irradiated in Three Mile Island (TMI) Unit 1[1,2]. The calculated results of ^{134}Cs for the one-cycle-irradiation fuel samples and those of ^{133}Cs for the two-cycle-irradiation fuel samples were compared with the measured data. The averaged C/E-1s of ^{134}Cs and ^{133}Cs were −11.2% and 2.9%, respectively. They were similar to those with the previous studies. The C/E-1s were also compared with those with SCALE 5.1 (ENDF/B-V)[1] for ^{134}Cs and those with SCALE 6.1.2 (ENDF/B-VII.0)[2] for ^{133}Cs. The differences in the C/E-1s were mainly attributed to the differences in the neutron capture resonance integrals (RIγs) of ^{133}Cs in the nuclear data libraries. The C/E-1s of ^{133}Cs and ^{134}Cs in the present study both indicated that a larger RIγ of ^{133}Cs than that in JENDL-4.0 would bring the C/Es closer to 1.

References
[1] Radulescu G, Gauld IC, Ilas G. SCALE 5.1predictions of PWR spent nuclear fuel isotopic compositions. Oak Ridge (Tennessee): Oak Ridge National Laboratory; 2010. (ORNL/TM-2010/44).
[2] Gauld IC, Giaquinto JM, Delashmitt JS. Re-evaluation of spent nuclear fuel assay data for the Three Mile Island unit 1 reactor and application to code validation. Annals of Nuclear Energy. 2016 Jan; 87(2):267-281.

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