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Feedback on neutron capture cross-section of¹³³**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 UO₂ 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 ¹³⁴Cs for the one-cycle-irradiation fuel samples and those of ¹³³Cs for the two-cycle-irradiation fuel samples were compared with the measured data. The averaged C/E-1s of ¹³⁴Cs and ¹³³Cs 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 ¹³⁴Cs and those with SCALE 6.1.2 (ENDF/B-VII.0)[2] for ¹³³Cs. The differences in the C/E-1s were mainly attributed to the differences in the neutron capture resonance integrals (RI γ s) of ¹³³Cs in the nuclear data libraries. The C/E-1s of ¹³³Cs and ¹³⁴Cs in the present study both indicated that a larger RI γ of ¹³³Cs than that in JENDL-4.0 would bring the C/Es closer to 1.

References

[1] Radulescu G, Gauld IC, Ilas G. SCALE 5.1 predictions 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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