Impact of Cross Section Library Update from ENDF/B-VI.8 to ENDF/B-VII.0 on BWR Fuel Lattice Burnup Characteristics

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ENDF/B-VII.0 was released December 2006. Many benchmark tests have been done with the new library against critical experiments to examine its predictability of criticality, showing the better results relative to those with the older ENDF/B versions. We investigated the impact of cross section library update from ENDF/B-VI.8 to ENDF/B-VII.0 on BWR fuel lattice burnup characteristics. The investigation has been done using MVP-BURN, Monteburns2 and LANCER01[1].

In the case of UO_2 fuel lattice with Gd rods[2], the differences in K_{inf} between the two libraries are plotted in Fig.1, showing that all the three methods yielded almost consistent exposure-dependent variation ranging over ±0.4%dK. The causes producing this behavior have been investigated by replacing B-VII.0 cross section data with B-VI.8 data one by one for important nuclides. As a result, four major contributors to the differences were identified, namely the update of U-238 capture cross section, Pu-241 capture cross section, O-16 (n,α) cross section and H-1 (bound in H_2O) thermal scattering kernel.

In addition, similar calculations were performed for two other cases, i.e. UO_2 fuel lattice without Gd rod and MOX fuel lattice with Gd rods, having shown that both the magnitude in reactivity and the behavior along exposure are different from the above case.
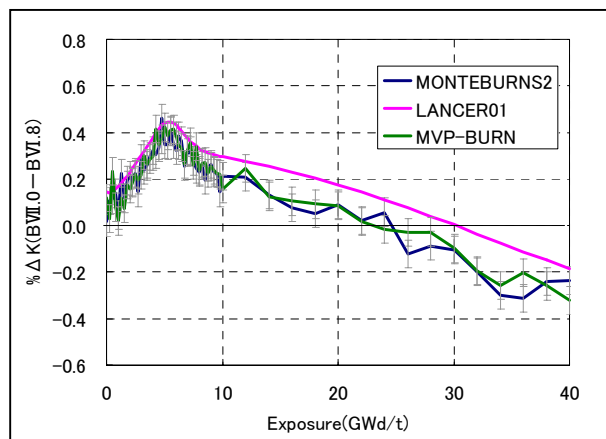

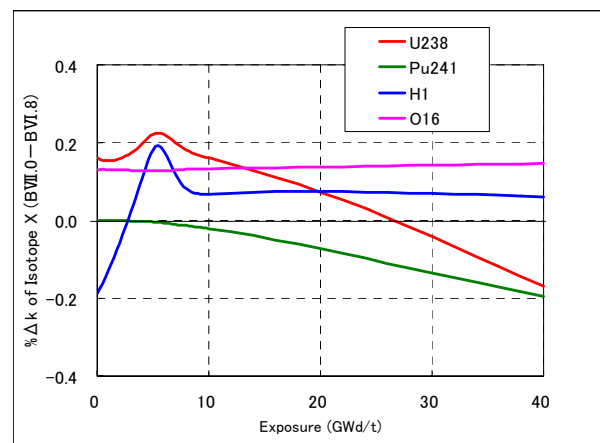
Fig.1 K_{inf} difference between ENDF/B-VI.8 and VII.0

Fig.2 The reactivity of isotope data update

Reference

[1] K. Azekura, *et. al.,* Development of a BWR Lattice Analysis Code LANCER Based on an Improved CCCP Method, ANFM2003

[2] C. Maeder, *et. al.,* International Comparison Calculations for a BWR Lattice with Adjacent Gadolinium Pins, NEACRP-L-271 (1984)