

Analysis of Uranium Isotopic Variation Effect of RUFIC Fuel on Burnup and Power Distribution in CANDU-6 Reactor

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Abstract

The impact of uranium isotopes variations in recovered uranium fuel in CANDU (RUFIC) have been investigated on the average exit burnup and power distributions. In this work, variations in U-235 content in the range of 0.92 ± 0.02 w/o were considered, and, for U-234 and U-236 isotopic variations, the ranges from 0.010 to 0.018 w/o and from 0.22 to 0.40 w/o were considered, respectively. 0.92 w/o U-235, 0.016 w/o U-234, and 0.34 w/o U-236 were used as the nominal specifications of the isotopic contents in the reference recovered uranium fuel. It is confirmed that a coefficient of 1.933 *MWh/kgU/mk* was obtained as the burnup gain/loss per *mk* of core reactivity in RUFIC-fuelled core with 4-BS scheme. The impact on channel and bundle powers was assessed by fuelling simulations for 1 full power day, and compiling the statistics on power variations, based on the instantaneous snapshot calculation. As a result, it is shown that the effects of U-234 and U-236 are so small that the effects can be disregarded. For U-235 isotope, it is found that, for a ± 0.02 w/o variation in U-235 content, the expected maximum variations (EMV) in channel and bundle powers were up to 1.38 % and 3.2 %, respectively, and, for a ± 0.01 w/o variation in U-235 content, the EMVs up to 0.6 % and 1.5 %, respectively.