

A Spent PWR Fuel Combination Method for Optimizing DUPIC Fuel Composition

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Abstract

A combination method of spent pressurized water reactor (PWR) fuel was proposed, which adjusts the fuel composition for direct use of spent PWR fuel in Canada deuterium uranium (CANDU) reactors (DUPIC). This method reduces the composition heterogeneity (variation) of the DUPIC fuel caused by directly reusing spent PWR fuel as DUPIC fuel feedstock. In this study, a combination method was used to find the optimum mixture composition from the spent PWR fuel database by minimizing the composition variation of major fissile isotopes ^{235}U and ^{239}Pu . The simulation results have shown that the combination method can reduce the composition variation of ^{235}U and ^{239}Pu to 0.11% and 1.40%, respectively, through assembly-wise mixing operation only. It is also believed that the result could be improved further through rod-wise combination technique, if isotopic composition of each spent PWR fuel rod is known by direct measurement during the DUPIC fuel fabrication process.