## Burnup Simulation of High-Density Fuel in a VVER-1000 Fuel Assembly

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**Abstract.** This study presents a comparative neutronic analysis of four high-density fuel (HDF) candidates for potential application in VVER-1000 fuel assemblies. The evaluated fuel types include uranium-based metal, silicide, carbide, and nitride compositions. Simulations were conducted using a VVER-1000 fuel assembly model to investigate burnup behavior and the evolution of the multiplication factor throughout the fuel cycle. Based on the burnup-dependent behavior of K<sub>inf</sub>, the most promising candidates are metal and nitride fuels. The findings support the feasibility of implementing selected high-density fuels to improve reactor core optimization and extend cycle length in VVER reactors.