Technical area 3: Evolutionary Water Reactors & Modular Water Reactors

UPGRADED VVER-440 REACTOR CORE WITH FUEL RODS OF DECREASED DIAMETER

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Various ways of improvement of VVER fuel cycle parameters, enhancement of the core safety in different accidents and expansion of the maneuver range have been studied in RRC "Kurchatov Institute". Such improvements can be achieved by simultaneous increase of the fuel rod number in fuel assembly and decrease of fuel rod diameter.

The paper summarizes the 3-D calculational results obtained by CONSUL program system for VVER-440 four-year equilibrium fuel cycle with fuel rods of decreased diameter (7.6 mm instead of 9.1 mm). The number of fuel rods in advanced fuel assembly equals 168 instead of 126 in serial option.

The following main parameters are presented in the paper:

- fuel burnup in four-year equilibrium cycle;
- period of the operation in the equilibrium fuel cycle;
- core power distribution versus burnup;
- maximum fuel rod linear power;
- reactivity coefficients versus burnup.

All these results are compared with the results obtained for the core with serial VVER-440 fuel assemblies and also for cores with fuel assemblies proposed for VVER-440 by Western companies – BNFL, EVF and Westinghouse.