



**VALIDITY OF USING  $UPuO_2$  VIBROPACK EXPERIMENTAL FUEL PINS IN REACTORS ON FAST AND THERMAL NEUTRONS. FIRST EXPERIMENTS ON CONVERSION OF WEAPON-GRADE PLUTONIUM INTO NUCLEAR FUEL**

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Extensive scope of scientific and technological work has been carried out in SSC RF RIAR to substantiate usage of vibropack oxide fuel pins in fast and thermal neutron reactors. To fulfill the work, physical-mechanical and technological characteristics of granulated fuel have been studied, radiation tests and material science investigations of mock-up have been carried out, experimental and research fuel pins of BN-type (in BOR-60 and BN-600 reactors) and VVER-1000 type (in SM-2 and MIR reactors). Total quantity of fabricated fuel pins is about 30 000 pieces. In BOR-60 reactor maximum burn up attained - 30 % h.a. and for regular SA burnup was 32,3% h.a. for experimental fuel pins of the dismountable SA. In testing  $UPuO_2$  vibropack fuel pins in BN-600 reactor the maximum burn up attained was 10,8 % h.a. Post irradiation examinations of fuel pins have revealed that since the problems both of chemical and thermo-mechanical fuel-cladding interactions were solved, the resource of the fuel pins would only depend on the choice of cladding material. Vibropack fuel pins, containing  $UPuO_2$ , under conditions of MIR reactor attained burn up more than 30 MW day/kg U both under nominal operation and under load-following modes.

The experience in designing, manufacturing and operating the facilities on fabrication of granulated uranium and uranium-plutonium oxide fuel and fuel pins has been gained. Created was the data bank and calculation codes describing vibropack fuel pin behavior under different operation modes.

According to the Concept of RF Minatom on utilisation of surplus weapon-grade plutonium, arisen from disarmament, the State Scientific Center of Russian Federation RIAR (Dimitrovgrad) has begun practical realization of the technology on conversion of metal weapon-grade plutonium into mixed uranium - plutonium oxide fuel. There has been processing carried out and obtained was granulated  $UPuO_2$  fuel for BOR - 60, BN - 600 reactors and experimental batches of granulated fuel for mock-up and experimental fuel pins of VVER type, which are intended for testing in SM and MIR reactors.