

APPROACHES TO FORM THE BN 1200 CORE START LOADING USING MOX-FUEL AND MNUP-FUEL

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Two types of mixed uranium-plutonium fuel are considered for BN-1200 reactor within the framework of “Pro-ryv” project: conventional, well-mastered MOX-fuel and advanced mixed uranium-plutonium nitride (MNUP) fuel having higher density.

The main design mode of reactor operation is operation in the equilibrium mode with scattered batch refuelings. As compared with equilibrium state, the start-up core is formed of fresh FSAs completely. Taking this fact into account, in the course of forming of the start-up core consisting of FSAs with fuel enrichment by plutonium corresponding to the equilibrium mode with retention of total quantity of FSAs in the core, it will have an excess reactivity margin. The reactivity margin of the start-up core shall be predicted considering its possible deviation caused by fuel manufacturing tolerance and by uncertainties of core critical parameters estimation. For this reason, in the start-up core design, even increased fuel enrichment may be considered, and, in any case, measures to compensate possible excess reactivity margin due to development of an appropriate core layout shall be provided.

Basic criteria to select the start-up core layout are to meet regulatory requirements on reactivity balance and to provide the possibility of reactor operation at nominal power without exceeding design parameters of FSA operation.

The paper considers possible methods to compensate excess reactivity margin of the start-up core, presents basic approaches to form the start-up core loading, and describes its layout in the case of MOX-fuel and MNUP fuel application.

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