

International Conference on Management of Spent Fuel from Nuclear Power Reactors: An Integrated Approach to the Back End of the Fuel Cycle



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Performance Assessment of Fuel Assemblies Removed from Shut-Down RBMK Reactor Cores for Reburning in Operating Power Units

A peculiarity of the RBMK reactors is online core refueling. So, the core contains fuel assemblies with burnup varying from zero to the maximum design value. When the reactor is shut down for decommissioning, the quantity of the fuel assemblies that have not reached the maximum design burnup may be significant. In 2018 –2035, the design lifetime of the RBMK reactors operated in Russia will expire. In case of step-by-step decommissioning, such fuel can be burnt in the RBMK units which are still in operation. The use of the fuel of good residual performance minimizes fresh fuel requirements.

To continue burning the fuel assemblies removed from the core of a shut-down reactor, they should be cooled in a pool to decrease the decay heat. Once the acceptable residual heat is achieved, the fuel assemblies should be delivered to the reactor. These procedures are not standard, and their influence on the fuel should be taken into account in making a decision on further burning of the fuel assemblies.

The paper presents an assessment of candidate fuel assemblies for further burning in operating power units and analyses condition of RBMK FAs of different burnup. It also addresses thinning of fuel rod claddings induced by corrosion and fretting, changes in mechanical properties of the FA structural materials, and criteria of fuel fitness for further burning by the main operational characteristics, i.e. dimensions, tightness, and weld health. Corrosion effect on the fuel rod claddings during cooling in the pool after the reactor defueling is assessed. The assessments speak for residual performance of the RBMK SFAs sufficient for their safe reburning in operating units of the same type.

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