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CHALLENGES IN THE FABRICATION AND RECYCLING OF MIXED CARBIDE FUEL

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Abstract

Mixed (U0.3, Pu0.7)C fuel is the driver fuel for Fast Breeder Test Reactor (FBTR) at Kalpakkam, India. This fuel is being fabricated at Radio metallurgy Division, Bhabha Atomic Research Centre (BARC). The reactor was made critical with Mark-I fuel having composition (U0.3, Pu0.7)C in year 1985. The fuel has seen a maximum burn up of 165Gwd/t. The carbide fuel is pyrophoric in nature and very much susceptible to hydrolysis. Hence the handling of fuel is done inside alpha leak tight glove-boxes having N₂ as cover gas. The fuel is fabricated by classical powder pellet route. In the recent past a new fuel fabrication facility has been commissioned and improvement over the existing equipments and process steps have been carried out to make the fuel fabrication process more efficient resulting in higher productivity and lesser contact between personnel and radioactive powder. The use of liquid binder and lubricant has eliminated dewaxing step from the process flow sheet for UC pellet fabrication. Dry recycling of the fuel is carried out on regular basis by oxidizing the mixed carbide powder. Chemically accepted pellets having physical defects are directly recycled by crushing and milling the pellets to powder form and subsequently following other regular process steps to produce sintered pellets.

Country/Int. Organization

India

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