AGA 6: Fissile Materials

Zeit: Freitag 9:30–10:30 Raum: S Aula

AGA 6.1 Fr 9:30 S Aula

Long-lived Fission Products in the Spent Fuel from Accelerator-Driven Systems in a Transmutation Fuel Cycle — •Friederike Friess[1,2] and Wolfgang Liebert[1] — [1]ISR, Universität für Bodenkultur Wien (BOKU), Österreich — [2]IANUS, TU Darmstadt, Deutschland

In the light of the still unsolved problem of radioactive waste disposal, the idea of Partitioning and Transmutation (P&T) of minor actinides or all transuranic elements in fast reactors systems is proposed as a possible solution. Doing so would reduce the radiotoxicity of the spent fuel, leading proponents to the conclusion that safe containment in the final repository must be ensured only for several thousand compared to millions of years.

Based on depletion calculations for a generic Accelerator-Driven System (ADS), the build-up of different radionuclides in the spent fuel, assuming inert matrix fuel with an increased content of minor actinides, is calculated. Their concentration is compared to the concentration in conventional spent fuel. The focus lies on long-lived fission products such as Zr-93, Te-99, I-129 and Cs-135 that are of great relevance to the long-term safety evaluation of the final repository. The study shows that a P&T fuel cycle leads to an unproportional high generation of Cs-135 in the spent fuel. Results indicate that it might not be sufficient to only consider the amount of additional fission products when evaluating the impact of different fuel cycles on the spent fuel inventory.

AGA 6.2 Fr 10:00 S Aula

The PRISM Reactor as a Possible Option to Deal with the British Civilian Plutonium Stockpile — •Christopher Fichtlscherer[1] and Friederike Friess[1,2] — [1]IANUS, TU Darmstadt, Deutschland — [2]ISR, Universität für Bodenkultur Wien (Boku), Österreich

Dealing with stocks of separated weapon-usable plutonium is a big challenge for our modern society. This work focuses on the British civil plutonium stockpiles, which amount to 103.3 tons. One option is seen in irradiating the plutonium in a fast reactor under development, namely the GE PRISM reactor. The PRISM reactor is a small modular, fast reactor which has a thermal power of 840 MW and an electrical output of 311 MW. It is intended to use MOX fuel and proponents claim, that it thus would be possible to produce clean energy, while making the plutonium proliferation resistant.

A MCNP model of the reactor is built and depletion calculations with different target burnups of the fuel were conducted to check whether the burned material would fulfil the Spent-Fuel Standard. Particularly it was checked whether the spent fuel is self protecting, meaning that the dose rate does not fall below a limit of 1 Sv/h in 1 meter distance after a cooling period of 30 years. Based on the reactor model calculations the irradiation time to fulfill this limit for the spent fuel is calculated. Based on the needed target burnup, it can be verified, whether it is possible for the PRISM reactor to render the civil plutonium proliferation resistant in only 20 years as is is claimed by its proponents.