IMPROVEMENT OF IRRADIATION TARGET DESIGN FOR THE PRODUCTION OF CALIFORNIUM-252 WITH FAST NEUTRON SPECTRUM.

SIBOMANA DAMASCENE1, ROMAN FOMIN1

1Institute of Nuclear Power Engineering NRNU MEPhI, Obninsk, Russia

Email: [sibomanad20@oiate.ru1](mailto:sibomanad20@oiate.ru1), [RVFomin@mephi.ru](mailto:RVFomin@mephi.ru)1

Obninsk, Russia

**Abstract**: The use of californium-252 in reactor start-up, neutron activation analysis, neutron radiographs, and nuclear medicine is increasing. But its production amount is still low due to the complex conversion chain, fission losses in the process of producing californium-252, and the limited number of reactors with enough neutron flux density needed for its production. That is why different studies are carried out to improve the production of californium-252 and make it easily available to all industries for different applications. The high-flux reactor SM-3, with its high neutron flux up to 1015/cm2sand flexible irradiation channels, is used in the production of californium-252. This paper focuses on different features needed to design a good irradiation target and appropriate irradiation conditions in the reactor core to increase capture to fission ratio and conversion ratio in the first neutron spectrum, which are the most important parameters influencing the yield of californium-252.And simulation of the irradiation of the target in SM-3 using serpent software to understand the transmutation process in the target material. It is shown that when target material and target structure are chosen suitably, production rates rise. The yield of californium-252 is also strongly influenced by the target loading method in the irradiation channel.