

THERMAL MECHANICAL ANALYSIS OF A LOW ENRICHED URANIUM FOIL BASED ANNULAR TARGET FOR THE PRODUCTION OF MOLYBDENUM-99

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ABSTRACT

One of the US department of Energy's global threat reduction initiative goals is to eliminate the use of high-enriched uranium from the production of the radio-isotope Molybdenum-99. One strategy to achieve this goal is to use a target that utilizes a low-enriched uranium (LEU) foil. This thesis considers an annular target, where an LEU foil of open cross section is sandwiched between two concentric aluminum tubes.

The target must contain the fission products until it can be opened and the LEU foil removed for further processing. The thermal contact resistance between the LEU foil and the aluminum tube cladding needs to be low enough to ensure that the LEU temperature doesn't exceed the operating temperature specified by the reactor safety case. Numerical and analytical models were used to analyze the behavior of the target and it is found that the current annular target design is safe at high LEU heat generation rates.