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New technology for ^{99}Mo isotope production using LEU-foil target

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ABSTRACT

Tajoura Nuclear Research Center (TNRC), Libya, will implement the technology for ^{99}Mo isotope production using LEU-foil target (This target is made of a LEU metallic uranium foil inserted between two concentric aluminum cylinders), to obtain new revenue streams for the TNR-reactor and desiring to serve the Libyan hospitals by providing the medical radioisotopes. Korean target will be used in this work which will be irradiated for 72 hours in the reactor core at flux equal to $1.0 \times 10^{14} \text{ N/Cm}^2\text{.S}$. The target will stay 10 h. in the reactor pool for cooling before disassembling it inside a hot cell located in the reactor building. The LEU-foil will be transferred to chemical hot cell pneumatically. A special set up has been designed for the processing of LEU-foil. The set up consists of the dissolver with controlled pressure, nitric acid will be used for dissolution, cold trap cooled in liquid nitrogen for removing the fission gases, precipitation of Mo-99 by fresh 2% alpha-benzoin-oxime will be done and purification of the final product by using two chromatographic columns: the first one contains AgC (carbon coated with silver nitrate) and the second one is a combined column with C, HZO-1 (hydro zirconium oxide) and AgC. The final product of Mo-99 solution will be filtered with $0.22 \mu\text{m}$ filter. The final radioactivity of Mo-99 expected to be $>150 \text{ Ci}$ and 95% purity.

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