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Production of Medical isotope Technecium-99 from DT Fusion neutrons JOHN BOGUSKI, Purdue University, CHARLES GENTILE, GEORGE ASCIONE, Princeton Plasma Physics Laboratory — High energy neutrons produced in DT fusion reactors have a secondary application for use in the synthesis of valuable man- made isotopes utilized in industry today. One such isotope is metastable Technecium-99 (Tc99m), a low energy gamma emitter used in $\sim 85\%$ of all medical imaging diagnostics. Tc99m is created through beta decay of Molybdenum-99 (Mo99), which itself has only a 66 hour half-life and must be created from a neutron capture by the widely available and stable isotope Molydenum-98. Current worldwide production of Tc99m occurs in just five locations and relies on obtaining the fission byproduct Mo99 from highly enriched Uranium reactors. A Tc99m generator using DT fusion neutrons, however, could potentially be operated at individual hospitals and medical facilities without the use of any fissile material. The neutron interaction of the DT neutrons with Molybdenum in a potential device geometry was modeled using Monte Carlo neutron transport code MCNP. Trial experiments were also performed to test the viability of using DT neutrons to create ample quantities of Tc99m. Modeling and test results will follow.

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