

Overview: Argonne Assistance in Developing SHINE Production of Mo-99

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ABSTRACT

Argonne National Laboratory is providing technical assistance to SHINE Medical Technologies in their efforts to become a domestic Mo-99 producer. Significant progress has been made in successfully producing, separating, and purifying 1-2 Ci of Mo-99 using Argonne's LINAC, 5 L of low enriched uranyl sulfate solution, and the mini-SHINE (Subcritical Hybrid Intense Neutron Emitter) experimental setup. Turbidity, pH, and conductivity are continuously monitored during irradiation, and gas generation rates and fission product speciation have been measured during each mini-SHINE run. Important decisions related to centrifugal contactor design and target solution cleanup have been made, and as a result, considerable advancements in the areas of plant design and waste optimization have occurred. Argonne has reviewed SHINE process flow diagrams for Mo recovery, purification, and periodic target-solution cleanup and optimized potential waste streams to minimize costs and meet specifications for radioactive-waste disposal. Additionally, modeling and experimentation associated with bubble formation and precipitation have been examined. This paper provides an overview of Argonne progress in developing SHINE's process for Mo-99 production.