Design of a Tritium Purification System for SHINE Mo-99 Production

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ABSTRACT

The SHINE process uses a novel method in the production of Mo-99 for medical applications: a Neutron Driver Accelerator System (NDAS) to create neutrons using deuterium-tritium fusion to irradiate target solutions of low-enriched uranium (LEU). To support the SHINE neutron production process, a tritium fuel cycle is needed to supply, recover, purify, isotopically separate, and store tritium for the accelerator target gas.

The Savannah River National Laboratory (SRNL) along with the support of the Savannah River Nuclear Solutions (SRNS) Design Engineering team, have analyzed the needs of SHINE process to create a design of the Tritium Purification System (TPS). The TPS components are required to receive and purify the process gases from the NDAS, as well as to provide evacuation of tritium-containing gases and process stripping functions to minimize tritium emissions. An overview of the SHINE TPS design will be presented.