



ORNL-INL Data Driven Optimization Production and Harvesting Tool

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Abstract. In the past ²³⁸Pu in the United States was mainly produced at the Savannah River site, in reactors which had large volume available for irradiations. Additionally, the reactors at the Savannah River site had a high neutron density. Today, available reactor real estate for isotope production is limited. Furthermore, the real estate available, not always have a neutron flux profile ideal for ²³⁸Pu production. To complicate things the demand from a multitude of programs to perform nuclear material testing and a variety of experiments on such reactors are on the rise. Therefore, in order to achieve and maintain a consistent production, resources and logistics have to be optimized. NASA's plan initial plans are to use the High Flux Isotope Reactor (HFIR) and Advanced Test Reactor (ATR) for irradiation of targets. Both reactors will play a vital role in creating and maintaining a constant and reliable ²³⁸Pu production. However, both facilities differ in key parameters such as operating power, cycle length, as well as irradiation facilities type and geometry. In order to overcome these differences along with achieving and assuring a consistent production, a collaboration between INL and ORNL has been created. The collaboration aims to foster an open exchange of ideas, expertise, data and tools in order to streamline ²³⁸Pu production. One of the key components of this collaboration is the creation of a data driven harvesting production framework. The framework will utilize experimental and simulation data, to determine an optimized production path. The framework goal is to maximize production as well as to use available resources in an efficient manner.

Keywords: ²³⁸Pu, Data, Optimization.