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## Contaminants of the Bismuth Phosphate Process as Signifiers of Nuclear Reprocessing History

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Reagents used in spent nuclear fuel recycling impart unique contaminant patterns into the product stream of the process. At the Pacific Northwest National Laboratory we have conducted research in the form of bench top and modeling experiments to characterize and understand the relationship between these patterns and the process that created them. A main challenge to this effort, resurrecting processes that were employed at the Hanford site from 1944-1989 have been retired for decades. This precludes direct measurements of the contaminant patterns that propagate within product streams of these facilities. In the absence of any operating recycling facilities at Hanford, we have taken a multipronged approach to cataloging contaminants of U.S. reprocessing activities using: (1) historical records summarizing contaminants within the final Pu metal button product of these facilities; (2) samples of opportunity that represent intermediate products of these processes; and (3) lab-scale experiments and model simulations designed to replicate contaminant patterns at each stage of nuclear fuel reprocessing. This paper summarizes our findings in this study.

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