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Characterization of U.S. Plutonium: Understanding Our Data

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Most of the US's plutonium and highly enriched uranium was produced for our nuclear weapons program. The plutonium is nominally characterized as containing ~93% ^{239}Pu and the HEU as containing ~93% ^{235}U . However, these two isotopes alone are not sufficient to uniquely characterize either of these two elements. For both HEU and Pu, additional isotopes may be required, coupled with chemical data. This paper will discuss the approach we developed to characterizing US plutonium.

US plutonium was produced in two different types of reactors, operated at two separate sites. A total of eight light-water cooled, graphite moderated reactors were operated at the Hanford Engineering Works (HEW). Five heavy-water cooled and moderated reactors were operated at the Savannah River Site (SRS). Plutonium produced by irradiation of natural uranium in these two reactors types can be distinguished by its isotopic vector (^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Pu , and ^{242}Pu). However, when we compared the isotopic vector of plutonium in our current stockpile, it often "looked" quite different from what we originally produced. The paper presents information on "as produced" US plutonium and how that relates to "in inventory" plutonium.

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