

Recycled uranium isotopes (^{238}U , ^{235}U , ^{234}U , ^{236}U , ^{233}U and ^{232}U)

Water

Uranium is pre-concentrated by evaporation or co-precipitation. The resulting solid material is dissolved in a mineral acid.

The determination of recycled uranium isotopes is carried out on duplicate sample fractions: one fraction is spiked with a uranium-232 internal standard; the other fraction is not spiked.

Uranium in the duplicate fractions is isolated by anion-exchange chromatography followed by extraction chromatography. Uranium in the purified non-spiked fraction is electrodeposited onto a stainless-steel disc, which is then measured by alpha spectrometry. The purified spiked fraction is split into two: one part is processed for measurement by alpha spectrometry; the other part is analysed by inductively coupled plasma mass spectrometry (ICP-MS) to determine uranium isotope ratios.

The uranium-238 and uranium-232 are determined from the two alpha spectrometry measurements; the other uranium isotopes are determined from the ICP-MS isotope ratio measurements relative to uranium-238.