Rapid determination of U-236 in the soil contaminated by the Fukushima Daiichi Nuclear Power Plant accident using single extraction chromatography combined with triple-quadrupole inductively coupled plasma-mass spectrometry

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Method Development for ^{236}U in Soil

Based on use of the new generation of triple-quadrupole ICP-MS (ICP-MS/MS), two procedures were proposed: a total dissolution with HF + HNO_3 + $HClO_4$ followed by single DGA chromatographic separation (Figure 1). The analytical accuracy and precision of $^{236}U/^{238}U$ ratios, measured as $^{236}U^{16}O^+/^{238}U^{16}O^+$, were validated by using the reference materials IAEA-135, IAEA-385, IAEA-447, and JSAC 0471.

U Isotope in the Soil Contaminated by the FDNPP Accident

For 46 soil samples contaminated by the FDNPP accident, the $^{236}U/^{238}U$ isotopic ratio ($(0.99–13.5)\times10^{-8}$) was comparable with those of global fallout values found in surface soil in Japan [1, 2], indicating the release of radioactive U from the FDNPP accident was a trace amount.

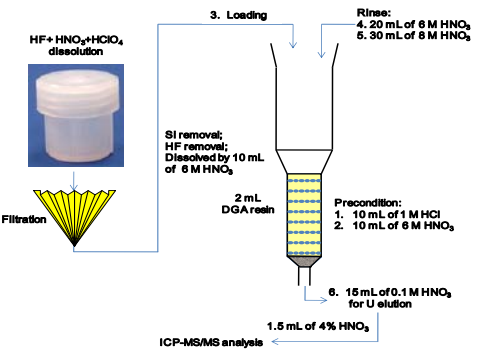

Figure 1: Experimental procedure.

[1]Sakaguchi *et al.* (2009) *Sci. Total Environ.* **407**, 4238–4242. [2] Sakaguchi *et al.* (2010) *Sci. Total Environ.* **408**, 5392–5398.