Samarium-151 and Promethium-147

Soils
These two radionuclides are analysed as part of a single separation scheme. A known amount of samarium is added at the outset as yield tracer for both elements. Soils are ashed, leached (or completely digested, as necessary) in mixed acids. Sm and Pm are separated and purified using ion-exchange and extraction chromatography. The determination is by liquid scintillation spectrometry using a Quantulus 1220. Both elements are measured by the net count rate in a defined energy window in the beta spectrum. The samarium yield tracer alpha peak is used to assess the chemical recovery. The counting efficiency is found by the method of internal standard addition. Ni-63 is used as the efficiency standard for Sm-151 as the beta spectra are almost identical. Certified reference solutions of this and Pm-147, traceable to national standards, are used.

Waters
These two radionuclides are analysed as part of a single separation scheme. A known amount of samarium is added at the outset as yield tracer for both elements. Waters low in dissolved solids are evaporated to small volume with the addition of nitric acid, or, in the case of high dissolved solids content, a co-precipitation is done to reduce the load of salts. Sm and Pm are separated and purified using ion-exchange and extraction chromatography. The determination is by liquid scintillation spectrometry using a Quantulus 1220. Both elements are measured by the net count rate in a defined energy window in the beta spectrum. The samarium yield tracer alpha peak is used to assess the chemical recovery. The counting efficiency is found by the method of internal standard addition. Ni-63 is used as the efficiency standard for Sm-151 as the beta spectra are almost identical. Certified reference solutions of this and Pm-147, traceable to national standards, are used.