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2.2-P16. Rapid nuclear event determination by caesium-137, stroncium-90 and plutonium activity and atomic ratios

Global nuclear test fallout, the large scale nuclear accidents at the Chernobyl nuclear power plant (NPP) in 1986 and at the Fukushima Daiichi NPP in 2011 caused a widespread dispersion of technogenic radionuclides all over the world. These events have proven that radionuclides can reach territories from the source even at a distance of thousand kilometres under favourable meteorological conditions and can be detected by radionuclides "finger prints" which depend on their source. In this work a rapid comprehensive method considering optimisation of man-hours of work, materials and including activities such as radiochemistry, alpha-, mass- and gamma-spectrometry techniques combined together for radionuclide determination and assessment source is demonstrated. Alpha spectrometry was performed with the state-of-the-art "Ortec" alpha spectrometer, gamma spectra were recorded by SILENA gamma-spectrometric system with a HPGe detector and radionuclides atomic ratios were measured by a sector field mass spectrometer combined with a high sensivity APEX sample introduction system. According to 137Cs/90Sr, 137Cs/239,240Pu, 238Pu/239,240Pu and 240Pu/239Pu activity and atomic ratios the contamination origin was determined. It was assessed that global fallout and Chernobyl accident sources prevail in nowadays collected soil samples while Fukushima Daiichi radionuclide fallout influence is not detected. The scheme of working hours optimisation is demonstrated.

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Track Classification: 2. Events and their characterization