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Assessment of Radionuclide Release According to the Plutonium Isotopic Composition in the Environment

Plutonium isotopic composition analysis is an important and reliable tool for determination of the artificial radionuclide source. As each anthropogenic emission could be characterized by its own unique radionuclide composition, these" finger prints" make it possible to determine the evidence of radionuclide contamination source reliably. In order to find out the Chernobyl accident influence, samples of undisturbed grassland soils, mature forests and shallow lakes were taken from southern and south-western regions where Chernobyl plume travelled over the Lithuania. 238Pu/239+240Pu activity ratio was measured with the alpha spectrometric technique, 240Pu/239Pu isotopic ratio measured by the inductively coupled plasma high resolution mass spectrometry. 238Pu/239+240Pu activity and 240Pu/239Pu isotopic ratios varied within 0.02 – 0.18 and 0.187 – 0.267, respectively. Based on linear interpolation method described it has been shown that fall-out evidence of the Chernobyl fourth reactor is still clearly seen even after twenty five years after the meltdown, although its signs are vanishing. The explanation of that reason is given. The significant fall-out inhomogeneity in nearby sampling locations is discussed as well.

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