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T1.3-P10. Man-made nuclear fission iodine-129 and plutonium determination and behaviour in soil

Activity and atomic ratios of long-lived radionuclides such as iodine-129 and plutonium-238,239,240 are the useful parameters for identifying above- or underground nuclear event when it is already not possible to detect short-lived radionuclides (the right time to determine was missed) as their values depend on the radionuclide source and the processes of their formation. In order to determine a possible nuclear event and contamination source fifty soil samples were collected in the whole territory of the Lithuania, in fifteen of them iodine-129 was assessed. Three different techniques for measurements of samples were used: accelerator mass spectrometry for iodine-129, inductively coupled plasma mass spectrometry for iodine-127, plutonium-239 and plutonium-240, alpha spectrometry for plutonium-238 and plutonium-239,240 determination. By 129I/127I atomic ratio and 238Pu/239,240Pu activity and 240Pu/239Pu atomic ratios it was evaluated that global fallout iodine-129 and plutonium prevails, although it was revealed that 129I/127I atomic ratio decreased significantly distancing away from the sea deeper into the country drawing an atomic ratio baseline for assessment of possible nuclear contamination in future; plutonium activity and atomic ratios in the southern part of the territory indicated partial Chernobyl contamination. The peculiarities of different iodine-129 and plutonium migration parameters downwards into the soil are discussed, too.

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