Contribution ID: **268** Type: **Poster**

Problems of determination of Tc-99 in soil and sediments

Monday, 17 September 2012 17:30 (1h 30m)

The 99Tc is a long lived (T1/2=2.11×105 years) fission product. It is worldwide spread as remains of global fallout. It is also released from nuclear reprocessing factories and was present in nuclear accident fallout, like Chernobyl for instance. This is also a decay product decay of short lived (T1/2=6 h) 99mTc, the most popular nuclear medicine isotope. The large difference in half life time reduces the activity in huge scale: 1 GBq of parent isomer state produces 3 Bq of the daughter. fallout. Since the global fallout was formed as a sum of deposition from hundreds individual events in a course of years the resulting deposition pattern is supposed to be rather uniform. Chernobyl fallout is much more patchy.
Our project was devoted to the recognition of the presence of 99Tc in environment of Poland. Samples of peat, forest soil and litter, sewage and river sediments were subject of our analyses. The 99Tc is a pure beta emitter (Emax 300 keV) and thus it can be measured by LSC. Due to long half life time it is also possible to measure it by means of ICP MS. In course of our analyses both techniques were applied. After mineralization and Tc separation on TEVA column each sample was divided into two parts: one was counted using LSC, second was examined by means of ICP MS. The chemical recovery was monitored using 95mTc and gamma spectrometry but an attempt was done to replace it by stable renium.
The presentation will describe the difficulties which we faced in course of the project and the ways how we solved the problems. The results of analyses will be presented as well.

Research supported by Polish Ministry MNiSW nr N305 066936 grant.

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Session Classification: Poster Session

Track Classification: Radioactive elements in the environment, radiation archeometry and Health Physics