

On the distribution of total beta activity in different granulometric fractions of bed sediments from the Danube river

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Abstract: Samples collected from vertical profiles of sediments from the Romanian sector of the Danube river were analysed for total beta activity. After subtraction of ^{40}K , the remaining activity was correlated with grain size diameter of the sediments.

Résumé: Dans un secteur Roumain du fleuve Danube ont été prélevés des sédiments dans quelques profils significatifs, en vue d'établir une corrélation entre l'activité bêta globale et le diamètre des granules. Après soustraction de l'activité due au ^{40}K , on a déduit que la plus grande activité est incorporée dans les grains de <0.1 mm diam. et de 0.125 mm, et le minimum a des grains de 0.4 mm diam. L'analyse par spectrométrie gamma de ces fractions a montré la présence du ^{137}Cs et du ^{226}Ra de la série naturelle de l'U-Ra dans le plupart des échantillons.

Materials and Methods: Sediment samples from profiles of the Danube river bed (1) were collected in a 10 x 10 km Romanian sector. After granulometric separation by sieving, the fractions were analysed for total beta activity by the use of a low level beta counting installation.

Many of the same samples were also analyzed for gamma activity using a "Nuclear Data 66220" multi-channel analyzer coupled to a Ge(Li) crystal with 3.5 keV at the ^{60}Co gamma lines.

Conclusions: After the subtraction of ^{40}K activity, sediment samples with a grain diameter >1 mm showed only background levels. Higher activities in the grains of <1 mm or 0.125 mm diameter were found in the samples collected during the spring compared to those collected in autumn. By gamma spectrometry ^{137}Cs alone has been identified in a single granulometric fraction, or associated with ^{106}Ru - ^{106}Rh , ^{54}Mn , ^{60}Co and sometimes with $^{113\text{m}}\text{Cd}$ (14.6 years). ^{226}Ra from the U-Ra natural radio-nuclide series was also identified (2).

It must be stressed that the total gamma as well as the total beta radioactivity in the sediments collected during 1981 was lower than the maximum permissible international level (3). It is concluded that the artificial radionuclides identified in the Danube samples arise from atmospheric fallout (4).

References:

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Paper presented by S. Fowler (IAEA)

Discussion

F. CARVALHO: Recent data from monitoring gamma emitters in Portuguese river sediments, indicates that radionuclides such as ^{106}Ru , ^{54}Mn , ^{60}Co , $^{113\text{m}}\text{Cd}$ were never found. In the absence of nuclear power plants in these Portuguese areas we must conclude that they are also not presently measurable from fallout. Their presence in other areas therefore might imply contributions from nuclear power plants.