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RADIOACTIVITY MONITORING ASPECTS FOR ENVIRONMENTAL CONTROL AFTER CHERNOBYL ACCIDENT IN ALBANIA

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Environmental measurements of vegetation, food, water, soil and air continue to become increasingly important. These measurements often must be performed on large numbers of samples requiring one or more screening techniques, such as low-background gross α/β-counting with proportional detectors of gross γ-counting technique which reduce sensibly labor and cost expenses.

In order to find any relation between the overall γ-radioactivity and contents of the most important long-living radioisotopes of Chernobyl origin in this radioactivity (^{134,137}Cs) the calibration work for portable gross γ-counters utilized in custom houses was necessary. One could expect such a relation keeping in mind the other authentic environmental -contributors presence in the objects almost in the same ratios and their γ-radiation takes a very small part in the total activity compared to permissive levels of ^{134}Cs and ^{137}Cs in food and other products.

Another reason justifying our expectations is the fact that chemical and physical properties involved in the process of radiation measurement are variable within some intervals being permissive from the radiation protection scope point of view. This logic enabled us to convert simply the total γ-count rates into ^{134}Cs and ^{137}Cs concentrations after having made the respective calibration of some portable NaI (Tl) counters. For this scope we have used the SGSR 54 IO, NaI (Tl) (1.5" 1") French probe.

In our lab the two low-level systems of Canberra production with anticoincidence protection and order background of 1 cpm are in operation. The efficiency calibration is performed by artificial standards (^{40}K) prepared as a set of KCl sources ranging from some mg to 1500 mg mass. The respective curve is $\varepsilon=0.2982-1.13810^{-4}$ m, where m represents the mass in mg used for the source preparation.

For all products that manifest total γ-radioactivity near or higher than certain critical level of 370 Bq/kg the more accurate analysis is carried out in lab, mainly by the means of high resolution γ-spectrometry as Canberra S-100. Keeping in mind the permissible concentrations of ^{134}Cs and ^{137}Cs in food as 600 Bq/kg that convention offers an additional guarantee in monitoring.

In order to check the reliability of in situ and in lab measurements made by portable gross γ-counters and γ-spectrometers the absolute measurement of activity concentration in several radioactive solutions as ^{134}Cs and ^{137}Cs, ^{198}Au, ^{131}I etc. is carried out applying the multidimensional efficiency extrapolation and efficiency tracing using a special $4\pi\beta-\gamma$ coincidence system.

The express method of radioactivity monitoring has been until now very efficient in situ conditions, identifying special cases of radioactivity polluted materials, such as tobaccos, chemical fertilizers, China dishes, metallic scraps, etc. In all these cases our results were in plain accord with ones. The analogue teams abroad declared for the same materials.

In some other cases metallic scraps (of a melting factory and cooper and aluminum packages), which are not controlled by our service, were refused by foreign partners abroad after having found radioactivity in them. Performing measurements by gross γ-measurement equipment the quite significant radioactivity was found identifying some small contaminated metal pieces. Using γ-spectrometric analysis by means of Canberra S-100 MCA in lab it has been found ^{226}Ra applied for luminescence. In some other cases the highly ^{60}Co contaminated metallic parts of a certain type of vehicles imported from the East countries were detected. Probably their origin is from radiotracers in steel metallurgy.