AEROGAMMA-SPECTROMETRIC MONITORING OF THE EARTH SURFACE

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The basic task of radioecological monitoring is in receiving a reliable information about radiation conditions, and,first of all, their changes for estimation of radiation safety in the location of people's residence and activities. The aerogamma-spectrometric (AGS) method is the only one to provide for a reliable and efficient information about radiation conditions on large territories. This method has been successfuly applied in Russia since 1963, originally being used to solve problems in geology. In the course of the AGS method improvement in Russia, a special attention was paid to increasing the sensitivity and ensuring the stability of equipment parameters, as well as to the metrological assurance of AGS measurements as a whole.

A high sensitivity is ensured by using a set of identical detecting units (their number is limited only by the possibilities of an aircraft), while stability of parameters is provided by an effective system of energy scale stabilization. As the experience shows, when using an aerogamma-spectrometer with 22 NaJ(Tl) crystals, 200 mm in diameter and 100 mm in height, without any adjustment, during 3 - 5 months, the ambient temperature changing from -5° to $+50^{\circ}C$, the energy scale for each crystal and the whole detecting unit is not changed by more than 0.5 % from the initial value.

When advanced equipment is available, methodical and metrological support of the work plays the most important role for receiving a reliable information in AGS monitoring. Aerogamma-spectrometers have the same measurement assurance as energy spectrometers. A high quality of the final result is achieved by using a set of measurement techniques. Natural testing grounds certified in the rank of State standard materials of the Russian Federation, are used as a refernce standard. Several of such testing grounds have been already certified for the content of thorium, uranium and potassium in rocks and the radiocesium in the upper soil layer. Small-volume (up to 10 l) working sources are used to adjust and control the stability of equipment parameters.

Measurement results are reduced to the Earth surface level taking into account the distortions of the energy spectrum of rock gamma-radiation by the atmosphere and the differencies in passing of rock gamma-radiations and technogenic radionuclides through the atmosphere. Preliminary results have been obtained on accounting for the local landscape peculiarities and the nature of penetration of radionuclides in the soil.

The AGS technology (VIRG-Rudgeophisika) as a whole (equipment, methodical and metrological support, application packages, etc.) has made a good showing to solve both various geological and radioecological problems. Specifically, this technology was widely and successfully used for mapping of the radioactive contamination of the territory after the accident at the Chernobyl atomic power station. A high reliability of the AGS results is proved by earth sampling.