

**The specific activity of radionuclides
mineral raw materials in the construction of Tuva**

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The specific activity of radionuclides in mineral construction materials of Tuva

Abstract. The results of measurements of the specific activities Ra^{226} , Th^{232} and K^{40} in the construction materials. Measurement of the activity was carried out in a certified radiometric complex software. It is noted that the clay Bii-Khem and Shumsky deposits are characterized by moderately increased activity.

Key words: radon, natural ionizing irradiation sources, the specific activity of radionuclides, construction supplies.

Since modern man leads most of the time indoors, the background radiation inside the buildings plays a primary role in people exposed. The field of gamma - radiation indoor largely created in building materials used for the construction of buildings. Suitability of natural materials and the waste industry for the manufacture of building materials is estimated using the effective specific activity of natural radionuclides, which is determined by the formula: $eff = ARa + 1,31 ATh + 0,085 AK$, where ARa and ATh - specific activity of radium - 226 and thorium - 232, which are in equilibrium with the rest of the natural uranium and thorium series; AK - specific activity of potassium - 40 (Bq / kg). Radiation safety standards recommend the use of materials for the construction of buildings with eff less than 370 Bq / kg for road construction outside urban areas - less than 1500 Bq / kg. Fitness standards for construction minerals is desirable to apply at the stage of prospecting and exploration. To comply with the maximum intensity of the radiation safety of gamma - radiation in the environment must not exceed the dose rate at the open area of more than 0.2 mSv / h (20 IFRB) [1]. The bulk of the population receives radiation from natural radionuclides (NRN) contained in the earth's crust. In this regard, it is interesting to NRN content in building materials and products, which is especially important for relatively harsh climatic conditions, when a person has to be a long time indoors.

Table 1 shows the results of measurements of specific activity Ra^{226} , Th^{232} and K^{40} in raw materials, recovered from the quarries of Tuva. Measurements were performed in the laboratory of radiation ecology station agrochemical service of Tuva». Measure the activity was conducted on the certified radiometric complex «USK Gamma plus» with the software.

Table 1.

The specific activity of radionuclides in mineral building raw materials

Name materia	field	UD. activity, Bq/kg (the average of the samples)			A _{eff} , Bq/kg (average)
		Th ²³²	Ra ²²⁶	K ⁴⁰	
clay	Biy-Khem	16, 53	27,33	536,3	97,91
clay	Krasny Yar	19, 15	28,8	517,2	100,84
clay	c. Shui	27, 72	31,31	607,8	120,39
sand	c. Kyzyl	14,02	9,23	487,8	79,25

The table also shows the values of the effective specific activity of samples (A_{eff}), calculated with regard to the biological impact of each nuclide [1]:

$$A_{\text{eff}} = A_{\text{Ra}} + 1,31A_{\text{Th}} + 0,085A_{\text{K}} \quad (22)$$

Red sand and clay-Iarskaia have a specific activity of natural radionuclides, which is close to the average for the crust. Clay Bii-Khem and Shumsky fields are characterized by moderately increased activity.

Data obtained from measurements will be used to assess the contribution of construction materials in the background radiation areas.

Conclusion

The results lead to the following conclusions:

1. First determined the specific activity of radon and its daughter products in construction materials (sand, clay), extracted from the quarries of Tuva.
2. It is noted that the clay Bii-Khem and Shumsky deposits are characterized by moderately increased activity.
3. Found that the specific effective activity of finished products and raw construction material used in the construction of Kyzyl, does not exceed 200 Bq / kg and comply with sanitary regulations regarding the content of radionuclides in building materials.

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List of literature

1. Radiation safety standards (NRB-99/2009): Sanitary rules and norms (SanPiN 2.6.1.2523 - 09). M: Federal center of hygiene and epidemiology of Rospotrebnadzor, 2009. 100 C.

