The intensity of the characteristic radiation for the lead material was more than 15% of the radiation transmitted through the material with an attenuation coefficient of about 3.5. The same value for tungsten is 2% when the external radiation is attenuated by a factor of 2. When external radiation is weakened by a factor of 10 or more, secondary radiation becomes dominant in the exposure of personnel wearing radiation protective clothing.

## 4 Conclusion

The developed spectrometric method for measuring the radioprotective properties of composite materials using radionuclide sources makes it possible to test the effectiveness of emergency protective clothing for firefighters under external radiation exposure.

Measurement of the attenuation coefficient of external radiation by the material and the spectrum of the characteristic radiation of the composite allows to optimize its composition and performance.

The secondary characteristic radiation and convection electrons generated by the external radiation are emitted from the inner layer of the composite material of the protective clothing. This radiation can significantly increase the residual radiation dose of protected personnel.

To increase the effectiveness of individual radiation protective clothing, the composite material must have a density gradient of the distribution of the metal component over the thickness.

*References:*

[1] Pavlenko VI, Edamenko OD, Yastrebinsky RN, Cherkashina NI, Radiation-Shielding Composite Material Based on Polystyrene Matrix, *Bulletin of Belgorod State Technological University*, No.3, 2011, pp. 113-116

[2] Burmistrov YuM, Skorkin VM Study of X-ray radiation in composites with metals irradiated by neutrons and photons. *Journal of Surface Investigation: X-ray, Synchrotron and Neutron Techniques*, Vol.13, No.2, 2019, pp. 195-198.

[3] Andreev AV, Burmistrov YuM, Zuyev SV, Konobeevski ES, Mordovskoy MV, Firsov VI, The low-background gamma spectrometer with high-purity germanium detector, *Yadernaya fizika i inzhiniring*, Vol.4, No.9-10, 2013, pp. 879-881 (in Russian).