

Evaluation of the Results of Neutron Activation Analysis of the Moss-Biomonitoring Samples Collected in the Industrial Areas on the Czech-Polish Border

^{1,2}Svozilíková Krakovská A., ^{3,4}Svozilík V., ^{1,5}Zinicovscaia I., ¹Vergel K., ^{3,4}Jančík P.

¹*Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, Moscow Region, 141980 Dubna, Russia*

²*Faculty of Mining and Geology, VSB—Technical University of Ostrava, 708 00 Ostrava-Poruba, Czech Republic*

³*Laboratory of Information Technologies, Joint Institute for Nuclear Research, Moscow Region, 141980 Dubna, Russia*

⁴*Faculty of Materials Science and Technology, VSB—Technical University of Ostrava, 708 00 Ostrava-Poruba, Czech Republic*

⁵*Department of Nuclear Physics, Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering, 30 Reactorului Str., MG-6, Bucharest-Magurele, Romania*

The goal of the research was the analysis of spatial data gained by biomonitoring with the use of mosses. A partial goal was set to characterize the regional atmospheric deposition of pollutants in the air based on the results of the analyses and simultaneously verify the suitability of using mosses as an alternative for monitoring air quality in smaller industrial areas. In total, 93 samples of moss were collected from the area of the Moravian-Silesian Region in the Czech Republic and the area of the Silesian Voivodeship in Poland throughout the years 2015 and 2016. The samples were analyzed using instrumental neutron activation analysis. Based on the analyses performed, 38 elements, which had been evaluated using the PCA, HCPCA, factor analysis, correlation analysis, contamination factor, geoaccumulation index, enrichment factor, and pollution load index, were found.

The analyses resulted in a division of elements into a group which with its concentrations neared the level of values of the natural background and a group of elements identified as emissions likely originating from anthropogenic activity (Sm, W, U, Tb, and Th). The likely dominant source of emissions for the studied area was identified to be the metallurgical industry. Simultaneously, the results pointed to sources of local importance. The area of interest was divided into clusters according to the prevailing type of pollution and long-distance transmission of pollutants was confirmed. Biomonitoring of air using mosses proved to be a suitable method for characterizing atmospheric deposition.