Abstract

Dust concentration in the work environment, that occurs as a result of mining processes and floats in the air, is still the basic factor affecting health and even life of people employed in coal mines. Several hundred cases of occupational diseases related to pneumoconiosis are recorded every year among the employees of underground mining.

The aim of the doctoral thesis is to identify the hazard of harmful dust for the mining faces drilled with the heading machines, where the separate pressing and suction ventilation is used. The measurements were carried out in two mining headings, in extremely different mining and geological conditions, which was crusial in the assessment of the estimated risk based on the measurement results. The measurements taken in headings were being carried out for 10 months over a 3-year period, including a total of several hundred working shifts.

The work analyzes the literature, together with an indication of normative acts related to the topic of doctoral dissertation. It presents a review of devices that are used for the measurement of airborne dust, with the special emphasis on the modern measurement techniques. Another point that is described is a methodology for measuring the dimensional distribution of dust grains in a device, using the Mie theory. The theoretical part of the work is focused on the etiology of occupational disease, which is pneumoconiosis. Basic data on the development of the disease entity within the active and former employees of the mining industry is presented in that part. The work also includes an overview of the basic collective and individual protection measures applied at the workplace.

The practical part of the work includes a detailed description of the headings where measurements were made, measurement results obtained from optical and gravimetric dust meters, dimensional distribution of dust samples taken by laser diffraction and laboratory analysis of the amount of free crystalline silica in the samples of the mine dust that had been taken. The final stage of measurements includes the development of a procedure for the analysis of data related to the indications of optical dustmeters that had been built in the headings.

The carried out analyzes , the tests that were made, the estimated exposure values and the determined maximum values of airborne dust concentrations indicate a high risk of pneumoconiosis among workers of faces drilled with the heading machines. Therefore, it is necessary to continue research and to implement some new technologies in order to supervise and eliminate dust concentration in underground mining workings.