

**“Creation a Geological-Geophysical Model for Forecasting the Stability of the Roof Rocks of Coal Seams in the Karaganda Basin”**

submitted for the degree of Doctor of Philosophy (PhD)  
of speciality 6D070600-“Geology and exploration of mineral deposits”

At the present stage, the development of the coal industry in Kazakhstan is characterized by complex mechanization and automation of mining processes, which occurs with a simultaneous increase in the depth of development. In this regard, the problem of the roof rocks stability of coal seams in mine workings is considered relevant.

In the thesis of Satibekova S.B. fund materials, domestic and foreign literature, field and laboratory engineering and geological studies of petrographic, structural and textural features and physical and mechanical properties of coal-bearing rocks were analyzed and electrical apparent resistivity and caliper diagrams were interpreted. On the basis of these data, a numerical simulation of the geological and geophysical properties of the roof rocks of coal seams in the Karaganda coal basin was carried out.

The purpose and the main defended scientific positions of the thesis cover the main tasks, correctly stated. The structure of the dissertation corresponds to the approved plan.

The thesis consists of six chapters, introduction, conclusion and list of references. The first chapter considers the previously carried out geological and geophysical work in the Karaganda basin. The second chapter describes the geological structure of the basin. The third chapter is devoted to the methodology of field and laboratory studies. The fourth chapter provides geological factors influencing the formation of the composition and properties of coal-bearing rocks. The fifth chapter is devoted to the assessment of the physical and mechanical properties of roof rocks of coal seams according to geophysical logging data. The sixth chapter provides a classification of the roof stability, developed for the first time for the Karaganda coal basin.

Protected scientific positions and results in the thesis of Satibekova S.B. fully justified by the engineering-geological research and mathematical modeling. The created geological and geophysical model significantly contributes to the elimination of roof collapse through the use of real engineering and geological data of mine fields, which is presented at a qualitative level of confidence.

The practical and theoretical significance of the work is the research results that makes possible to evaluate the physico-mechanical properties of rocks in their natural occurrence using logging diagrams with sufficient density of grid over the area of the coal basin. The method allows simplifying and reducing a cost of

geological works for identifying of rock properties. This method covers a required number of wells for a forecast accuracy of mining and geological conditions at the coal basin development. As a result, it can enable to choose effective ways to control the roof in accordance with the created geological and geophysical model for predicting the stability of rocks.

Personal participation in obtaining scientific results was established by field observations in faces of mines at the Karaganda coal basin and laboratory studies during training, and internship in the State Key Laboratory of Coal Resources and Safe Mining, China University of Mining and Technology (Beijing).

In the “Department of Physical and Mechanical Testing of Rocks”, the doctoral student studied the cores of the wells to determine the physico-mechanical and dynamic properties (density, porosity, tensile strength compression and tension, information of geological materials such as compression (P) wave and shear (S) wave velocity information which can be used in calculating dynamic elastic constants such as Young's Modulus, Poisson's Ratio, Bulk Modulus, and Shear (Rigidity) Modulus. Based on a homogenous, intact, isotropic specimen of coal-bearing rocks is being tested these elastic constants are calculated.

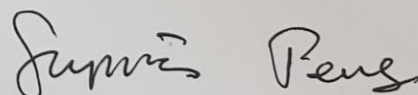
In the “Department of Microscopic Studies”, petrographic features and the degree of metamorphism were studied using a Leitz 307-107.002 microphotometer.

In the department of “Geophysics”, laboratory results were processed. geological and seismic models were built using experimental data of compression (P) wave and shear (S) wave velocity information on VMware Workstation Pro software in Linux, and built a numerical model on MATLAB 2018.

The completeness of the publication of the dissertation materials are presented by scientific articles in peer-reviewed journals with high impact-factors and reports at international scientific conferences.

As a Research co-supervisor, I want to note that the dissertation work on the topic **“Creation a Geological-Geophysical Model for Forecasting the Stability of the Roof Rocks of Coal Seams in the Karaganda Basin”** is relevant, completed research that has scientific and practical value for the coal industry. The thesis corresponds all the requirements for doctoral theses and the author is **Satibekova Sandugash Boranbaevna** recommended awarding the degree of **Doctor of Philosophy (PhD)** in the speciality **6D070600 – “Geology and Exploration of Mineral Deposits”**.

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