

**ANNOTATION**  
**dissertations for the degree of Doctor of Philosophy PhD**  
**in the specialty 8D07201 - "Geology and exploration of mineral deposits"**

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**RESERVOIR MODELING AND ANALYSIS OF PRODUCTION  
HORIZONS PATTERN OF THE FIELD IN THE MANGYSHLAK BASIN.**

**Relevance of research.** The Republic of Kazakhstan has established a plan for the development of the strategy by increasing the volume and rate of production by 2021-2025. in quantitative equivalent up to 100-120 million tons per year. The increase in production is possible due to the Paleozoic giants of Western Kazakhstan, as well as a group of deposits in the Mangyshlak basin, characterized by an increased content of sulfur and hydrogen sulfide. Necessity and economic efficiency of search and exploration of secondary hydrocarbon locations. The use of a reliable seismic forecast of the distribution of the deep horizons of Mangyshlak, which makes it possible to study in detail the geological patterns and find new areas of industrial significance for the field.

**The purpose** of the study is to build and establish the patterns of development of productive prospecting objects based on the analysis of the structure, to determine the further strategy of prospecting for deep Paleozoic horizons based on the development of new seismic methodological "approaches" and ideas that provide a higher assessment of the prospects for oil and gas potential and the probability of detection of secondary accumulations.

**Research subjects:**

1. Perform an analysis of existing and new data, clarify the nature of regional geotectonic features and geological models of the structure of basins;
2. To study the occurrence of elements of fault tectonics and the block structure of the territory, taking into account the identified regional and areal patterns of sedimentation features;
3. To clarify the nature of the structure and composition of deposits in the internal relatively deep-water regions of the Mangyshlak Paleozoic sedimentation basin;
4. To substantiate the prospects of search objects in relatively deep-water areas of the basin with predominantly terrigenous and carbonate-terrigenous sedimentation;
5. To identify regional patterns based on the geological model of seismic attributes in the Upper Jurassic and Paleozoic deposits associated with the distribution of facies in sand bodies;
6. To substantiate the effectiveness of the directions of search priority objects, recommendations for the rational placement and reuse of wells by types and volumes.

## **Object of study**

Deposit of the Mangyshlak basin

### **Scientific novelty:**

1. The new model was developed for the formation of Paleozoic deposits, taking into account the spatial relationship of large blocks of the basement, which makes it possible to clarify the structural-tectonic features and composition of the main lithological-stratigraphic complexes;

2. New promising objects have been identified, characterized by a single structural closure along the Jurassic deposits;

3. An alternative direction has been developed for searching for residual deposits of oil and gas fields, mainly in carbonate reservoirs, complicated by a high content of hydrogen sulfide and sulfur, which implies a significant increase in the cost of work and costs;

4. The established relationships, which are not large pledges associated with those subject to the constitution and massive type in the precipitated pre-essentially terrigenous and carbonate-terrigenous components of the relatively spring-loaded interior areas of the Mangyshlak basin, the depth of occurrence obliges to commit costs, out of nowhere the low concentration of hydrogen sulfide and serum at the depth under study will cause it to.

### **Protected scientific positions.**

1. The high prospects for the oil and gas potential of the Paleozoic deposits are determined by the block structure and the difference in the depths of the basement, which determined the duration of the sedimentation stages, lithofacies variability and significant thicknesses of promising deposits, as well as the development of large consedimentation uplifts and massifs of the Upper Jurassic deposits. Of paramount importance is the forecast and detection of significant hydrocarbon deposits that are environmentally friendly from hydrogen sulfide "contamination" in the marginal lateral sections of the sandy shoals of the formation channel, as well as the deep-water part of the basin, in areas of predominant terrigenous and carbonate-terrigenous sedimentation.

2. The seismogeological characteristic is due to a new method of interpreting deep-lying horizons based on a combination of seismic data and newly identified geological characteristics that form objects-uplifts at relatively older levels of deposits, reflected in a new representation of the patterns of distribution of anomalies of potential reservoirs and fault tecto according to the facies of sand bodies of the mouth bar.

3. Application of a new geological model of the site based on new seismic attributes. The main objects of interpretation are large uplifts at depths of 3.2-4.2 km in the internal relatively submerged areas of the Mangyshlak basin with predominantly terrigenous and carbonate-terrigenous sedimentation, which justify a significant expansion of the area of promising lands and favorable prerequisites for a significant increase in oil and gas reservoirs.

### **The main scientific and practical results of the dissertation.**

1. The geological boundaries of the continental part of the Mangyshlak

depression of the oil and gas region have been identified.

2. Information on the structural interpretation, assessment of the structural factor of the deposit area is presented. The structural and tectonic characteristics of the uplift zone of the Mangyshlak basin have been established.

3. According to the results of the seismogeological characterization, namely, the detailed binding of the calculated seismograms for the vertical components, which are the result of the passage of a model impulse (Ricker Wavelet) through an elastic homogeneous medium; by the method of interpretation of horizons based on the RMS amplitude attribute, the root-mean-square signal amplitude at each point of the seismic trace, the values of seismic attributes at the points of intersection of the wells were compared with the data on the thicknesses of the interval to identify the dependence of the type "seismic attribute - reservoir thickness"; tectonic disturbances of the Upper Jurassic and the prospects of the Paleozoic deep-seated deposits.

4. A new geological model was built with detailed parameters for the formation of productive horizons based on seismic attributes.

5. Recommendations have been developed for optimizing and increasing the productivity of the field for the search for residual oil.

**Structure and scope of the dissertation.** The dissertation is presented on 67 pages and consists of an introduction, seven chapters, a conclusion, recommendations and a list of sources used. The thesis is illustrated with 29 figures and 3 tables.

#### **Acknowledgment.**

The author expresses his deep gratitude to the scientific consultants, Doctor of Technical Sciences, Professor of the GRMPI Department Portnov V.S., PhD, PhD Mausymbaeva A.D. support, valuable advice and comments, as well as for support throughout the entire period of doctoral studies and writing a dissertation.

The author expresses special gratitude and deep gratitude to the foreign scientific consultant, Doctor of Geological and Mineralogical Sciences, Professor of the Department of Geosciences, Director of the Laboratory of Engineering Geology and Resources of CUPB Liu Zhen for valuable recommendations and scientific support, assistance in organizing research and conducting research, for the organization and assistance in passing scientific foreign internships.

The author thanks the teachers and staff of the department "Geology and Exploration of Mineral Deposits" of KarTU on the basis of which the research was carried out, recommendations were received and the dissertation work was written, as well as Wei Xiaodong, Science Adviser, Director of the Reservoir Exploration and Development Department in "BGP inc. CNPC" (China), for assistance in collecting material and building models, valuable advice and scientific advice. For valuable advice and consultations, the author thanks the Director of the Department of Technical Planning, Oil and Gas Prospecting and Exploration LLP "BGP inc. CNPC" (China) for assistance in conducting seismic interpretation on the basis of the Research Institute, PhD Madisheva R.K., for valuable advice in detailing the study of productivity deposits and registration of work according to standards.