VALUE OF SEISMIC INFORMATION IN HYDROCARBON EXPLORATION

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Exploration of hydrocarbons is a multi-stage process. In the course of its implementation, objects of various scale (from basin to traps) are identified, analyzed and evaluated. Geophysical and, in particular, seismic work, which provides key information about the subsurface structure, is carried out at all stages of exploration.

Seismic acquisition is an expensive work. The information it provides allows one to either discover new hydrocarbon reserves or save money by rejecting further operations. The value of information is usually estimated post factum, when a result (positive or negative) is obtained. A method is proposed for assessing the monetary value of seismic information at the stage of planning seismic surveys. If the monetary value of this information is greater than the funds spent on these works, then these works can be considered economically justified.

For solving the problem, it is proposed to use the indicator of the expected monetary value of the project - EMV. This economic parameter is calculated based on the cost of the project, the expected gain from the project and the risks. Exploration work in general is a business associated with risks, in particular, with geological risks. Seismic data provide additional information that reduces uncertainty. The seismic information can be used for better understanding trap, reservoir presence, charge access. Seismic velocity data can give us additional information for pore pressure and sealing capacity estimation. As a result, the estimated values of the risks of potential resources may change and this leads to a change in the value of EMV. The difference between the EMV values, respectively, before and after the seismic survey can be taken as an estimate of the value of the additional information.

This problem can be solved at various stages of geological exploration – from regional study to prospect evaluation. At the stage of regional work, basin models and geological risk maps are built. Based on those maps unnecessary exploration work on the high risk areas can be rejected and significant amount can be saved reducing the study area. At the stage of shooting 2D seismic lines or 3D seismic surveys, structures are identified and refined, and detailed charge models are built. In this case, the positive EMV difference before and after the seismic survey can be taken as the monetary value of this information.