

## **Cyclicity and reservoir properties of Lower-Middle Miocene sediments of South Kirinsk oil and gas field**

Nadezhda Kurdina

Lomonosov Moscow State University, Geology and geochemistry of oil and gas, Moscow, Russian Federation  
(nadya.kurdina@gmail.com)

Exploration and additional exploration of oil and gas fields, connected with lithological traps, include the spreading forecast of sedimentary bodies with reservoir and seal properties. Genetic identification and forecast of geological bodies are possible in case of large-scale studies, based on the study of cyclicity, structural and textural features of rocks, their composition, lithofacies and depositional environments. Porosity and permeability evaluation of different reservoir groups is also an important part. Such studies have been successfully completed for productive terrigenous Dagi sediments (Lower-Middle Miocene) of the north-eastern shelf of Sakhalin.

In order to identify distribution of Dagi reservoirs with different properties in section, core material of the one well of South Kirinsk field has been studied (depth interval from 2902,4 to 2810,5 m). Productive Dagi deposits are represented by gray-colored sandstones with subordinate siltstones and claystones (total thickness 90,5 m). Analysis of cyclicity is based on the concepts of Vassoevich (1977), who considered cycles as geological body, which is the physical result of processes that took place during the sedimentation cycle. Well section was divided into I-X units with different composition and set of genetic features due to layered core description and elementary cyclites identification. According to description of thin sections and results of cylindrical samples porosity and permeability studies five groups of reservoirs were determined. There are coarse-grained and fine-coarse-grained sandstones, fine-grained sandstones, fine-grained silty sandstones, sandy siltstones and siltstones.

It was found, in Dagi section there is interval of fine-coarse-grained and coarse-grained sandstones with high petrophysical properties: permeability 3000 mD, porosity more than 25%, but rocks with such properties spread locally and their total thickness is 6 meters only. This interval was described in the IV unit. In the IV unit lower cyclites elements consist of conglomerates and upper by above-mentioned sandstones. The appearance of conglomerates indicates a coastal-marine depositional environment.

The most widely spread reservoir type of Dagi section is fine-grained sandstones and fine-grained silty sandstones with porosity value 22-24% and permeability 100-500 mD. They present the lower elements of cyclites in I, II, VII and VIII units. These sandstones contain fragments of pelecypods shells and marks of bioturbation. There are long (up to 1 m) vertical burrows, which means shallow basin and a weak hydrodynamics.

The most clayey section parts (units V and VI) that are presented by wavy-horizontal interlayering of clayey siltstones and clayey-silty rocks contain reservoirs but of poorer petrophysical properties. Sandy siltstones with 14-23% porosity and permeability value 1-10 mD. In general, units V and VI are characterized by conditions of active hydrodynamic and sandy siltstones appearance - with additional supply of sediments with temporary flows. Presence of different reservoir groups in Dagi section is controlled by sedimentation factors and reflects succession of vertical genetic series. According to the preliminary assessment, rocks accumulated predominantly in coastal-marine and shallow-marine environment. Frequent change of lithotypes in Dagi section in well 5 of South Kirinsk field indicates significant changes of depositional environment whose diagnostic and identification are an integral part of the field exploration works.