Geophysical Research Abstracts
Vol. 14, EGU2012-343, 2012
EGU General Assembly 2012

Reconstruction of sedimentary environments of J2-4 reservoir rocks of the Lovin oil field by facial analysis and 3D simulation

R. Iagudin and N. Minibaev
Institute of Geology, Federal University of Kazan, Russian Federation (minibaev.nail@gmail.com)

The reconstruction of accumulations' conditions of sand bodies and determination of paleogeographical conditions is the basis for 3D modeling of lithologically screened oil and gas reservoirs.
The reconstruction of accumulations' conditions is implemented by lithologic-and-facies analysis. The facial types are determined during the analysis of deposits of oil reservoir and then mapped within the reservoir's space.
The facies type is an integral characteristic. It is determined on the basis of a large number of research methods such as the processing and analysis of core samples, seismic and well log data. Mapping of reservoirs' facies types allow estimating variability of important for exploration of oil deposits parameters such as reservoir properties, productivity, distribution of effective thickness, etc. The facies types can be mapped as an individual geological unit and used in 3D geological modeling.
Subject of facial analysis was sediments of J2-4 reservoir of Lovin oil field (Western Lovin structure) which were accumulated in the Jurassic period.
Based on lithologic-and-facies analysis of core material from 6 wells (25 samples), including studies on the grain size measurements, analysis of sediment's structure and core description, the metering of magnetic susceptibility of sediments, facies types of the J2-4 reservoir were identified.
The lithotype A is characterized by sand and silt structure, small nodules in the halo of pyrite oxidation, indicated the presence of magnetite. This lithotype belongs to conditions of river-bed facies.
The lithotype B have a silty structure, interlayer of coal and traces of bioturbation. This lithotype corresponds to the conditions of sand bars of the floodplain.
The lithotype C is characterized by silty-clay structure, single siderite nodules and the remnants of the fauna. This is referring to bog part of the floodplain.
After analyzing the well log data of 25 wells of Lovin oil field by Muromtsev methodology distribution of facies types of the J2-4 reservoir in vertical and horizontal directions was obtained.
Determined facies types are well traced in the wave field. They have a good contrast of acoustic stiffness. Facies are clearly seen in the study of impedance's maps which are calculated in the range of the J2-4 reservoir. Studies show that the lithotype A corresponds to the values of impedances 8200 <AI <9400, the lithotype B 9400 <AI <9800, the lithotype C 9800 <AI <10200.
The resulting map of facies types was used as a trend in a stochastic (probabilistic) simulation. Facies map was transformed into a probability map. Each point of the map describes the probability of a correct prediction of a particular facies type. Created 3D geological model allows displaying the most important features of the vertical and lateral variability of the J2-4 reservoir which was identified by the lithologic-and-facies analysis.
The resulting digital geologic model can be used for further exploration of the J2-4 reservoir of Lovin oil field and serve as a basis for hydrodynamic simulation of the reservoir.