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Geophysical investigations in superdeep wells of Russia: results and problems

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After finishing drilling of the Kola superdeep well, which until now remains the most deep one (12262m) worldwide, a number of superdeep wells were drilled in Russia. The En-Yakha superdeep well, which was completed in November 2006 at a depth of 8250m, is amongst them. At present, preparations for testing the well are under way. The well has been drilled in Western Siberia within the Bolshoy Urengoy field and is the most deep one drilled in sedimentary and volcanogenic deposits in Russia. The drilling operations were carried out under abnormal high pressure and temperature conditions (pressure gradient up to 1.9-2.0, bottomhole transient T=215 C). The well has intersected the entire section of Mesozoic deposits including deep-seated Jurassic and Triassic horizons. Below a depth of 6920m, the sedimentary units changed to a complex of effusive Triassic basalts. Comprehensive geological and geophysical studies of core material and fluids from the well, well bore and borehole environment investigations were performed. In particular, FGUP NPC “Nedra” and Schlumberger carried out comprehensive geophysical investigations in open hole at the final stage of drilling operations (7026-8250m). For the first time, such deep effusive deposits, over 1.2km thick, were investigated by two geophysical investigation packages, which are mutually complementary and overlap each other on a number of techniques. Even the first results indicate great importance of the investigations performed to study deep horizons of the earth and processes of their formation in the geological past.

In addition, the experience of drilling and investigations in superdeep wells, and the En-Yakha in particular, pose numerous questions related to investigation technologies, comprehensive processing, and interpretation of obtained data taking into account recent scientific and technical achievements in this area.