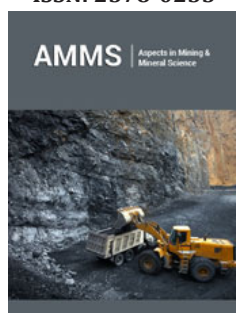


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Mining and Geological Features of Well Drilling in Western Siberia

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Opinion

Novoportovskoe oil-gas-condensate field belongs to Western Siberian oil and gas province. During drilling on this field, the next sections are distinguished:

- a. Liable to drilling mud losses. This drilling trouble results in full or partial loss of drill mud circulation, which can lead to an emergency;
- b. Liable to caving and failure. This drilling trouble can cause considerable narrowing of a borehole. Usually caving and failures occur in deviated intervals built with soft or unstable rocks;
- c. Liable to gas, water and oil shows; This phenomenon breaks normal process of drilling, causes equipment wear and leads to emergencies;
- d. Liable to sticking and jamming of BHA and drill string, differential sticking, packing, drilling mud thinning and etc.

Development of well construction has taken into account the next geological features of section: permafrost rocks occur in the interval of 0-260m (Table 1). The temperature varies from -7 to -1,5 °C, iciness is in the interval of 0,15-0,28. Reservoir pressures along the whole section of designed wells are equal to hydrostatic pressure ($K_a=1,00$). Gas horizons are lying in the interval of 505-2035m, anomaly ratio is $K_a=1,00$. Oil saturated horizons occur on the depth of 1013-2060m, anomaly ratio is $K_a=1,00$. Oil exploitation target U_{2-6} lies in the interval of 2040-2060m with reservoir pressure being $P_{RES2040}=205\text{kgf/cm}^2$ ($K_a=1,00$). On the base of geological section and drilling equipment, designed profile includes several intervals: one vertical interval, one zenith angle buildup section, two hold sections and one zenith angle drop section.

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Table 1: Substantiation of well construction.

The Name of Casing String	Diameter of Casing String, mm	Setting Depth (vertical), m	Purpose of Casing String: Substantiation of Selection of Diameter, Setting Depth, Sections
Conductor	426,0	50	Isolation of unstable rocks of quaternary deposits, increasing the durability of casing string for longitudinal stability in the permafrost interval and it is cemented to the wellhead.
Surface casing	323,9	480	The purpose and setting depth are selected with the condition of isolating permafrost rocks. Surface casing prevents from hydraulic fracturing of rocks near the shoe in case of gas blowout from Cenomanian strata (PK1) during drilling for intermediate casing. Surface casing increases the durability of casing string for longitudinal stability in the permafrost interval, prevents rocks from melting and failure. It also prevents from caving of rocks of the Oligocene and upper part of the Cretaceous systems in the process of drilling for intermediate string and provides isolation of groundwater of the Anthropogenic-Oligocene complex. The shoe of the casing string is installed in the interlayer of hard clays
Intermediate casing	244,5	1100	The setting depth of intermediate casing is selected to provide isolation of upper gas horizons, which lie in the interval of 505-1013m (vertical depth), and to cover unstable rocks, including upper Yarong suite. Another purpose of intermediate casing is providing compatibility of conditions for drilling for production casing with BOP on the wellhead. Intermediate casing increases the durability of casing string for longitudinal stability in the permafrost interval. The shoe of the casing string is installed in the interlayer of hard clays.
Production casing	177,8	2110	Production casing provides exploitation of development target, disconnects all productive horizons from each other, protects from fluid cross-flows between beds. Production casing increases the durability of casing string for longitudinal stability in the permafrost interval