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PHASE DIAGRAM – UNIQUE METHOD FOR PREDICTING HYDROCARBON PHASE CHANGE

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Analyzed Main Dolomite reservoirs, located in the western part of Poland, form the biggest oil fields discovered during last few years. These fields, located in fractured Zechstein formation are under high fluid pressure and does not show influence of hydrodynamic reservoir conditions. Proven recoverable reserves of crude oil in Lubiatów – Międzychód – Grotów field are 7.25 million tons, while the proven reserves of natural gas are about 7.3 billion m^3. As a result of its investments, the Polish Oil and Gas Company (PGNiG) will be able to significantly increase the production of natural gas and oil production in the coming years to about 1 million tons per year.

Currently built installation is planned only for oil exploitation which may cause situation when saturated oil will reach conditions below saturation pressure. Then two phase hydrocarbon recovery will reduce energy of dissolved gas and without any second and third method of intensification it will not be possible to get high recovery factor.

Main criterion for hydrocarbon classification, normally used in reservoir engineering, is construction of phase diagram which shows current average pressure vs. reservoir temperature.

Testing of perforated interval 3,166–3,202 m bsl in Sieraków-1 well gave two phase hydrocarbon inflow – oil and gas. The measured and interpreted Horner's pressure buildup provided 41 MPa in pressure. Temperature was on the level of 105^{o}C (Słupczyński et al. 2008).

Based on PVT fluid analysis for hydrocarbons and non-hydrocarbons composition, the authors constructed triangular graph and phase diagram (Ahmed 1989, Whitson & Brulé 2000). The phase diagram needed recombination and recalculation of p-T reservoir conditions (Well Test Analysis in Gas/Condensate Reservoirs 2004).

Described reservoirs lie in "Gas Condensate" region. The analysis of the phase behavior character show that almost all fluid samples are above bubble pressure. Only one well (Sieraków-1) shows two phase hydrocarbon inflow confirming sense of phase diagram construction.

Planned installation for oil exploitation can only reduce reservoir pressure and finally decrease recovery factor. The above results suggest changing the exploitation plan and starting enhance reservoir energy during the time of oil recovery.

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