

# Analisis geomekanika dan petrofisika kandungan TOC : studi kasus : "tight shaly sand reservoir" pada lapangan "X" = Analysis of geomechanics and petrophysical of toc content : case study "tight shaly sand reservoir" in the X field

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## Abstrak

Penelitian ini bertujuan untuk mengembangkan konsep/metoda analisis geomekanika dan kaitannya dengan petrofisika kandungan TOC serta penerapannya dalam rangka mengetahui potensi eksplorasi yang masih ada untuk pengembangan pada lapangan "X", ditemukan pada tahun 1975. Lapangan "X" hingga saat ini masih memproduksi gas dari reservoir yang bersifat "Tight, gas bearing and shaly sand reservoir". Pada penelitian ini dilakukan perhitungan sifat mekanika dari data sumur dan log data yang meliputi perhitungan hidrostatik, Overburden Pressure (Sv), Pore Pressure (Pp), Minimum Horizontal Stress (Shmin), Maximum Horizontal Stress (SHmax) dan Rock Strength - Uniaxial Compressive Strength (UCS). Data 2D Post Stack inversi seismik dipergunakan untuk mendapatkan distribusi mekanik dari Rock strength (UCS) dan nilai critical stress pada zona target (fasies batupasir, shaly-sand, serpih dan karbonat). Selanjutnya penelitian menghitung nilai estimasi TOC dengan Passey's Method (1990), menggunakan log sonik dan resistivitas serta penentuan nilai Vitrinite Reflectance (Ro) dan Level of Organic Maturity (LOM). Pada akhirnya, penelitian ini berusaha mencari hubungan antara sifat mekanis dan kandungan TOC pada reservoir. Data yang digunakan pada penelitian ini adalah meliputi tiga data sumuran (wireline logs), seismik 2D, data reservoir/engineering (Mudlog, RFT, DST, LOT/FIT, pressure tests), laporan sumur dan data geologi regional.

Studi analisis geomekanika pada lapangan "X" dapat ditentukan bahwa nilai critical stress maksimum sekitar 9000 psi untuk proses fracturing zona reservoir, yang bertujuan memperbesar aliran produksi hidrokarbon. Hasil petrofisika kandungan TOC pada ketiga sumur menunjukkan bahwa Formasi Bebulu (Early Miocene) di Kutai Basin berpotensi mengandung sumberdaya, baik conventional dan unconventional hydrocarbon.

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This research aims to develop the concept/methods geomechanics analysis and petrophysical relation to the content of TOC also its application in order to determine the exploration potential that still exists for the development of the field "X", discovered in 1975. Field "X" is still producing gas from the reservoir is "Tight, bearing and shaly sand gas reservoir".

The research is to calculate the mechanical properties from the well and log data, which include the calculation of hydrostatic, Overburden Pressure (Sv), Pore Pressure (Pp), the Minimum Horizontal Stress (Shmin), the Maximum Horizontal stress (SHmax) and Uniaxial Compressive Rock Strength-Strength (UCS). 2D Data Post Stack seismic inversion was used to get the mechanical distribution of Rock strength (UCS) and the value of critical stress on the target zone (facies: shaly sandstone, sand, shale and carbonates). Next step is estimate the toc value with Passey 's method (1990), using a sonic and resistivity log and also the determination of Vitrinite Reflectance (Ro) and the level of organic maturity (LOM). Finally, this research trying to find the relationship between the mechanical properties and the TOC content

in reservoir. The data used in this research are three well data (wireline logs), 2D seismic data, reservoir/engineering data (Mudlog, RFT, DST, LOT/FIT, pressure tests), well reports and regional geology data.

Studies of geomechanics analysis in the field "X" can be determined that the maximum value of the critical stress of about 9000 psi reservoir zones for fracturing process, which aims to increase the flow of hydrocarbon production. Petrophysical results of TOC content on all three wells showed that Bebulu Formation (Early Miocene) in the Kutai Basin has the potential to contain resources, both conventional and unconventional hydrocarbons.