

**THE STUDY OF GEOMECHANICAL AND PETROPHYSICAL
CHARACTERIZATION OF LONGMAXI FORMATION, SOUTH SICHUAN
BASIN, CHINA**

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Abstract

The Longmaxi Formation has a great shale gas commercial development and exploration potential; it is the lower Silurian Formation in the Middle and Upper Yangtze region. This thesis characterized the Longmaxi marine shale based on the well logs from two vertical wells and three horizontal wells in the southern Sichuan Basin, China. Geomechanical properties were determined by log data. The maximum permissible hydraulic fracturing net pressure with respect to the maximum fracture height was predicted.

The analyses show that there are two apparent boundaries in the Longmaxi Formation according to the log curves in the two vertical wells. Above the first boundary, the upper mudstone and limestone zone are located at the top of organic shale layer. Underneath the organic shale zone, there is a limestone zone. The well logs show low porosity (average 6%) in organic gas-bearing shale layer. The percentage of free gas account for about 50% of the total gas. The layer is high in quartz content (50%) and low in clay content (20%). These indicate the Lower Silurian Longmaxi Formation is highly brittle. Mechanical properties in the pay zone are less than that in intervals above and below the pay zone. This shows a good constrained zone which can keep the fracture propagated within the gas-bearing shale layers with respect to the fixed production rate and treatment pressure. According to my results, the maximum permissible net treatment pressure of vertical well 1 in the fracture is 12.9 MPa, whereas in the vertical well 2 the maximum permissible net pressure is 4.5 MPa because of its thinner shale layer thickness compared to the vertical well 1.



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