

# Optimalisasi Pengeboran Reservoir Tight Sand dan Shale Gas Pada Sub-Cekungan Jambi Melalui Estimasi Tekanan Pori Metode Drilling Efficiency Mechanical Specific Energy (DEMSE) dan Metode Bowers = Drilling Optimization of Tight Sands and Shale Gas Reservoir in Jambi Sub-Basin Based on Pore Pressure Estimation Using Drilling Efficiency Mechanical Specific Energy (DEMSE) and Bowers Methods

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## Abstrak

Analisis tekanan bawah permukaan dilakukan untuk mendeteksi adanya *overpressure* dan permasalahan pada sumur yang akan dilakukan pengeboran berdasarkan data sumur eksplorasi. Pada operasi pengeboran yang dilakukan pada sumur A, B, C, D ditemukan berbagai masalah pengeboran yaitu *kick*, *slogging shale*, dan *pipe sticking* yang dapat mengakibatkan tingginya *Non Productive Time* (NPT). Penelitian ini dilakukan untuk: pertama mengidentifikasi mekanisme *overpressure* di *Tight Sand Gas* dan *Shale Gas* pada Sub-Cekungan Jambi. Kedua melakukan prediksi tekanan pori menggunakan metode Bowers dan metode *Drilling Efficiency and Mechanical Specific Energy* (DEMSE) dan selanjutnya berdasarkan hasil analisis kuantitatif inversi seismik *post-stack* dapat memodelkan tekanan pori di daerah tersebut. Hasil analisis tekanan pori di sumur dan model tekanan pori 3D mengindikasikan bahwa *top overpressure* terjadi pada Formasi Gumai, kemudian berangsur-angsur turun mendekati tekanan hidrostatik pada Basement. Mekanisme *overpressure* diakibatkan oleh *undercompaction*, *fluid expansion* (kerogen maturation). 4. Formasi Gumai dan formasi Talang Akar merupakan batuan *shale* sehingga jenis lumpur yang baik digunakan adalah *oil based mud* (OBM). Batuan *shale* memiliki sifat *elasticity* sehingga *rate of penetration* (ROP) dan *weight on bit* (WOB) yang digunakan semakin besar.

The subsurface pressure analysis is used to detect the overpressure and problems in the well that will be drilled based on exploration well data. Various problems were found while drilling operations carried out on A,B,C,D wells, such as kick and pipe sticking which cause a high Non-Productive Time (NPT). This research is conducted to identify the mechanism of overpressure formation in tight sand gas and shale gas in the Jambi Sub-Basin. Furthermore, to predict pore pressure using the Drilling Efficiency and Mechanical Specific Energy (DEMSE) and Bowers methods. The final result will be a 3D pore pressure cube in the area based on quantitative analysis of post-stack seismic inversion. The results of the pore pressure analysis from the wells and the 3D pore pressure model indicate that top of overpressure occurs in the Gumai Formation, then it is decreasing gradually approaching the hydrostatic pressure on the Basement. The mechanisms of overpressure are caused by under compaction, fluid expansion (kerogen maturation). The Gumai Formation and Talang Akar Formation are shale rocks so the type of mud weight that is well used is oil based mud (OBM). Shale rocks have elasticity so that the rate of penetration (ROP) and weight on bit (WOB) that are used is getting bigger.