

ABSTRAK

PENENTUAN ZONA *ABNORMAL PRESSURE* MENGUNAKAN PENDEKATAN *PORE PRESSURE FRACTURE GRADIENT* DAN ANALISIS FASIES BERDASARKAN DATA SUMUR DI LAPANGAN “BALE”, FORMASI PARIGI DAN CIBULAKAN ATAS, CEKUNGAN JAWA BARAT UTARA

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Fenomena *loss circulation* yang sering terjadi selama kegiatan pengeboran di Lapangan Bale menunjukkan perlunya pemahaman yang komprehensif terhadap keberadaan *abnormal pressure* di bawah permukaan. Penelitian ini bertujuan untuk mengestimasi *Pore Pressure Fracture Gradient* (PPFG) menggunakan metode Eaton berbasis log resistivitas guna mendukung mitigasi risiko pengeboran, seperti mengetahui zona lemah. Analisis *abnormal pressure* dilakukan menggunakan bantuan excel *software*. Estimasi diawali perhitungan *overburden gradient*, penentuan *shale point*, serta penentuan *normal compaction trend* (NCT) sebagai dasar prediksi tekanan pori. Parameter geomekanika batuan, seperti nilai *poisson's ratio*, dihitung menggunakan persamaan RHOB Gardner melalui selisih rasio kecepatan gelombang P dan S (V_p/V_s) dengan log densitas sebagai alternatif karena tidak tersedianya data log sonik. Hasil interpretasi menunjukkan bahwa tekanan *abnormal* di Lapangan Bale berupa *underpressure* akibat dari *heat decrease* yang dikontrol oleh rezim sesar normal, berdasarkan klasifikasi rezim tegasan menurut Anderson tahun 1951 dengan hubungan $OBG > Sh_{max} > Sh_{min}$. Distribusi zona lemah yang terlihat pada *fracture gradient map* menunjukkan arah relatif timur laut–barat daya, sehingga rekomendasi pengeboran yang aman adalah dengan menghindari tren tersebut. Selain itu, hasil analisis fasies menunjukkan bahwa lingkungan pengendapan memungkinkan terbentuknya *limestone* yang memiliki pengaruh langsung terhadap pembentukan *underpressure*.

Kata kunci: *Abnormal pressure*, metode Eaton, *pore pressure fracture gradient*, sesar normal, *underpressure*.

ABSTRACT

IDENTIFICATION OF ABNORMAL PRESSURE ZONES USING PORE PRESSURE FRACTURE GRADIENT APPROACH AND FACIES ANALYSIS BASED ON WELL DATA FROM THE 'BALE' FIELD, PARIGI AND UPPER CIBULAKAN FORMATIONS, NORTH WEST JAVA BASIN

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The frequent occurrence of loss circulation during drilling activities in the Bale Field indicates the need for a comprehensive understanding of the presence of abnormal pressure in the subsurface. This study aims to estimate the Pore Pressure Fracture Gradient (PPFG) using the Eaton method based on resistivity logs to support drilling risk mitigation, such as identifying weak zones. The abnormal pressure analysis was conducted with the assistance of Excel software. The estimation began with the calculation of the overburden gradient, the determination of shale points, and the establishment of the normal compaction trend (NCT) as the basis for pore pressure prediction. Rock geomechanical parameters, such as Poisson's ratio, were calculated using the RHOB Gardner equation through the V_p/V_s ratio (difference between P- and S-wave velocities), with density logs as an alternative due to the unavailability of sonic log data. The interpretation results indicate that abnormal pressure in the Bale Field is characterized by underpressure caused by heat decrease, controlled by a normal fault regime, based on the stress regime classification of Anderson (1951) with the relationship $OBG > Sh_{max} > Sh_{min}$. The distribution of weak zones observed on the fracture gradient map shows a northeast–southwest trend, thus safe drilling recommendations include avoiding this trend. In addition, facies analysis results indicate that the depositional environment allowed the formation of limestone, which has a direct influence on the development of underpressure.

Keywords: Abnormal pressure, Eaton methode, normal fault, pore pressure fracture gradient, underpressure.