

ABSTRAK

EVALUASI FORMASI DAN ANALISIS GAS RASIO UNTUK IDENTIFIKASI FLUIDA LAPANGAN “*AMETHYST*”, INTERVAL *MAIN* FORMASI CIBULAKAN ATAS, CEKUNGAN JAWA BARAT UTARA

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Formasi Cibulakan Atas, khususnya interval Main di Cekungan Jawa Barat Utara, merupakan salah satu penghasil hidrokarbon utama. Formasi ini memiliki litologi batupasir berbutir halus dengan kandungan lempung dan salinitas tinggi. Kombinasi karakteristik ini menyebabkan nilai resistivitas rendah, yang dikenal sebagai *Low Resistivity Low Contrast* (LRLC), sehingga identifikasi keberadaan hidrokarbon menjadi kompleks. Tujuan penelitian adalah memahami lingkungan pengendapan yang berkaitan dengan variasi litologi, fasies, dan asosiasi fasies, menentukan jenis fluida, serta mengevaluasi karakteristik formasi meliputi volume lempung, porositas, dan saturasi air. Metode yang digunakan mencakup analisis batuan inti untuk penentuan litofasies, integrasi data batuan inti dan log, serta data biostratigrafi untuk penentuan fasies dan lingkungan pengendapan, analisis rasio gas menggunakan metode Haworth & Whittaker dan Pixler, serta evaluasi formasi dengan melakukan analisis kuantitatif menggunakan data log, khususnya penentuan saturasi air dengan metode Indonesia yang cocok dengan interval reservoir yang memiliki resistivitas rendah. Hasil menunjukkan empat litofasies utama, yaitu batupasir masif, batupasir *wavy*, batupasir *flaser*, dan batulanau *lenticular*. Mineral siderit yang konduktif ditemukan pada batupasir *wavy* berkontribusi pada overestimasi saturasi air. Terdapat empat asosiasi fasies—embriolik, akresi *immature*, akresi *mature*, dan *abandonment*—dengan fasies *tidal shelfridges* yang berkembang pada lingkungan *inner shelf* di zona litoral hingga *inner neritik* selama Miosen Tengah. Analisis gas rasio mengonfirmasi keberadaan gas, minyak, dan residu minyak. Karakteristik reservoir meliputi volume lempung 0,3–0,88 v/v, porositas variatif dari buruk hingga sangat baik, saturasi air 70–100%, dan saturasi hidrokarbon 1–20%.

Kata kunci: Cibulakan Atas, Evaluasi Formasi, Gas Rasio, *Tidal Shelf Ridges*

ABSTRACT

FORMATION EVALUATION AND GAS RATIO ANALYSIS FOR FLUID IDENTIFICATION IN “AMETHYST” FIELD, MAIN INTERVAL UPPER CIBULAKAN FORMATION, NORTHWEST JAVA BASIN

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The Upper Cibulakan Formation, particularly the Main interval in the North West Java Basin, is one of the major hydrocarbon producers. The formation has a fine-grained sandstone lithology with a high clay content and elevated salinity. This combination of characteristics leads to low resistivity values, known as Low Resistivity Low Contrast (LRLC), making identification of the presence of hydrocarbons complex. The objectives of the study were to understand the depositional environment related to lithologic variations, facies, and facies associations, to determine the fluid type, and to evaluate formation characteristics, including clay volume, porosity, and water saturation. The methods used include core rock analysis for lithofacies determination, integration of core rock and log data, and biostratigraphic data for facies and depositional environment determination, gas ratio analysis using Haworth & Whittaker and Pixler methods, and formation evaluation by conducting quantitative analysis using log data, particularly determination of water saturation using the Indonesian method which is suitable for reservoir intervals with low resistivity. Results show four main lithofacies, namely massive sandstone, wavy sandstone, flaser sandstone, and lenticular siltstone. The conductive siderite mineral found in the wavy sandstone contributes to the overestimation of water saturation. There are four facies associations-embryonic, immature accretion, mature accretion, and abandonment-with the tidal shelf ridges facies that developed on the inner shelf environment in the littoral to the inner neritic zone during the Middle Miocene. Gas ratio analysis confirmed the presence of gas, oil, and residual oil. Reservoir characteristics include clay volume of 0.3-0.88 v/v, porosity varying from poor to excellent, water saturation of 70-100%, and hydrocarbon saturation of 1-20%.

Keywords: Formation Evaluation, Gas Ratio, Tidal Shelf Ridges, Upper Cibulakan Formation