ABSTRAK

EVALUASI POTENSI *CARBON CAPTURE AND STORAGE* (CCS) BERDASARKAN PETROFISIK DAN PEMODELAN STATIK PADA FORMASI BATURAJA ATAS, LAPANGAN "SUN", SUB – CEKUNGAN JATIBARANG

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Penelitian ini bertujuan untuk menganalisis karakteristik reservoir dan mengevaluasi potensi Carbon, Capture, and Storage (CCS) pada Formasi Baturaja Atas di Lapangan "SUN", Sub–Cekungan Jatibarang, Cekungan Jawa Barat Utara. Analisis dilakukan pada sumur ORN–1, ORN–2, ORN–3, dan ORN–4 dengan mengintegrasikan data log sumur, data *core*, peta struktur kedalaman, data *acoustic impedance,* dan permeabilitas dari *hydraulic flow unit*. Metode yang digunakan meliputi analisis stratigrafi, analisis petrofisika, pemodelan statik tiga dimensi, analisis volumetrik, dan evaluasi kapasitas penyimpanan CO_2 menggunakan pendekatan data volumetrik dan produksi.

Hasil interpretasi stratigrafi menunjukkan bahwa Formasi Baturaja Atas tersusun oleh asosiasi fasies *near reef* dan *interreef lagoon* yang berkembang pada lingkungan *reef flat*. Analisis petrofisika menghasilkan nilai *cut-off Vsh* sebesar 0.32 dan porositas efektif sebesar 0.10. Hasil pemodelan statik menunjukkan sebaran reservoir yang terkontrol oleh distribusi properti petrofisika serta kualitas reservoir terbaik berkembang pada Zona 2 dan Zona 3 yang dicirikan oleh nilai porositas dan permeabilitas yang lebih tinggi dibandingkan zona lainnya. Perhitungan volumetrik menghasilkan estimasi cadangan hidrokarbon sebesar 53.95 MMSTB. Evaluasi potensi CCS menggambarkan Zona 2 dan Zona 3 menjadi interval yang paling prospektif untuk penyimpanan CO_2. Estimasi kapasitas penyimpanan CO_2 berkisar 0.18 – 6.29 juta ton CO_2 berdasarkan data produksi dan 4.3–8.9 juta ton CO_2 berdasarkan pendekatan OOIP. Hasil penelitian menunjukkan bahwa Formasi Baturaja Atas pada Lapangan "SUN" memiliki potensi yang baik untuk dikembangkan sebagai target penyimpanan CO_2.

Kata Kunci: Carbon Capture and Storage (CCS), Formasi Baturaja Atas, Kapasitas Penyimpanan CO_2, Petrofisika, Pemodelan Statik

ABSTRACT

EVALUATION OF CARBON CAPTURE AND STORAGE (CCS) POTENTIAL BASED ON PETROPHYSICAL ANALYSIS AND STATIC MODELING OF THE UPPER BATURAJA FORMATION IN THE "SUN" FIELD, JATIBARANG SUB-BASIN, NORTHWEST JAVA BASIN

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This study aims to analyze reservoir characteristics and evaluate the potential of Carbon Capture and Storage (CCS) in the Upper Baturaja Formation of the "SUN" Field, Jatibarang Sub–Basin, Northwest Java Basin. The analysis was conducted using data from four wells, namely ORN–1, ORN–2, ORN–3, and ORN–4 by integrating well logs, core data, depth structural maps, acoustic impedance data, and hydraulic flow unit (HFU). The applied methods include stratigraphic analysis, petrophysical evaluation, three-dimensional static reservoir modeling, volumetric analysis, and CO_2 storage capacity assessment using both volumetric and production based approaches.

The stratigraphic interpretation indicates that the Upper Baturaja Formation is composed of near reef and interreef lagoon facies associations deposited within a reef flat environment. Petrophysical analysis resulted in a shale volume (Vsh) cut-off value of 0.32 and an effective porosity cut-off value of 0.10. Static modeling results indicate that reservoir distribution is primarily controlled by the spatial distribution of petrophysical properties with the best reservoir quality occurring in Zone 2 and Zone 3 characterized by higher porosity and permeability values than the other zones. Volumetric calculations estimate the hydrocarbon reserves at 53.93 MMSTB. The CCS evaluation identifies Zone 2 and Zone 3 as the most prospective intervals for CO_2 storage. The estimated CO_2 storage capacity ranges from 0.18 to 6.29 million tonnes of CO_2 based on production data and from 4.3 to 8.9 million tonnes of CO_2 based on the Original Oil in Place (OOIP) approach. These results indicate that the Upper Baturaja Formation in the "SUN" Field has considerable potential for future CO_2 storage development.

Keywords: Carbon Capture and Storage (CCS), CO_2 Storage Capacity, Petrophysics, Static Modeling, Upper Baturaja Formation