

INTISARI

Formasi Cibulakan Atas merupakan formasi utama penghasil hidrokarbon pada area Offshore Northwest Jawa yang menjadi wilayah kerja PT PHE ONWJ (Pertamina Hulu Energi Offshore North West Jawa). Interval produktif dalam formasi ini tersusun atas lapisan perselingan antara batupasir dan serpih dengan ketebalan mencapai 45 kaki. Secara kondisi geologi, endapan tersebut merupakan endapan laut dangkal yang dipengaruhi oleh arus pasang surut yang kuat pada Sub-Cekungan Ardjuna, bagian lepas pantai Cekungan Jawa Barat. Formasi Cibulakan Atas interval *main* memiliki komponen penyusun berupa perselingan antara batupasir dan batu lempung. Identifikasi sebaran reservoir dilakukan dengan mengkorelasikan lapisan konektivitas reservoir (batupasir) yang dibatasi oleh marker sikuenstratigrafi. Karakteristik dan kualitas reservoir yang berkembang pada penelitian diidentifikasi dapat diidentifikasi berdasarkan fasies dan lingkungan pengendapan maupun properti petrofisika tiap lapisan batuan melalui pemodelan geostatistik. Metode yang digunakan dalam pemodelan fasies menggunakan metode kombinasi antara *Truncation Gaussian Simulation* (TGS) dan *Sequential Indicator Simulation* (SIS), sementara itu dalam pemodelan properti petrofisika metode yang digunakan merupakan metode *Sequential Gaussian Simulation* (SGS). Berdasarkan analisis data log secara sekuen stratigrafi, reservoir "R" dapat terbagi menjadi 8 lapisan reservoir yang memiliki potensi mengandung hidrokarbon. Lapisan tersebut tersebut terdiri dari lapisan reservoir R-1, R2, R3, R4, R5, R6, R8 dan R9. Analisis fasies dan lingkungan pengendapan daerah penelitian terbentuk pada lingkungan laut dangkal dengan fasies penyusun berupa F1 (*sandstone very good (VG) Porosity*), F2 (*sandstone good (G) Porosity*), F3 (*shally sand*) dan F4 (*marine shale*) yang berasosiasi dengan fasies *Tidal Sand Ridges* (TSR). Hasil pemodelan fasies menggunakan metode kombinasi dapat menggambarkan sebaran reservoir pada area penelitian dengan baik (diferensial histogram <5%), dengan arah persebaran reservoir relatif timur laut barat daya (N 10° E s/d N 25° E dengan persentase luasan tubuh lapisan masing-masing reservoir sekitar 20% sampai 60% total luas area penelitian. Pemodelan properti petrofisik menunjukkan bahwa reservoir R-4 memiliki potensi untuk dikembangkan lebih lanjut, hal ini dikarenakan secara karakteristik reservoir tersebut memiliki sebaran *rocktype 1* (RT-1) yang dominan dengan porositas dapat mencapai 28% dengan SwJ (Saturasi Air Fungsi J) sebesar 32% dan N/G (*Net to Gross*) 71%. Secara volumetrik, reservoir R-4 memberikan kontribusi volumetrik hidrokarbon sebesar 128.8 MMSTB (*Million Stock Tank Barrels*) minyak bumi dan 9.2 BSCF (*Billions of Standard Cubic Feet*) gas alam (*basecase*). Total perhitungan cadangan volumetrik *basecase* pada 8 zona reservoir diperoleh cadangan sebesar 312.55 MMSTB minyak bumi dan 60.99 BSCF gas alam.

Kata kunci: Pemodelan Geostatistik, Pemodelan Fasies, Pemodelan Properti Petrofisika, Estimasi Cadangan Hidrokarbon.

ABSTRACT

The Upper Cibulakan Formation is the primary hydrocarbon-producing formation in the Offshore Northwest Java area, operated by PT PHE ONWJ (Pertamina Hulu Energi Offshore North West Java the Productive Interval in this formation is composed of interspersed layers between sandstones and shales with a thickness of up to 45 feet. In geological conditions, these deposits are shallow marine deposits that are influenced by strong tidal currents in the Ardjuna Sub-Basin, the offshore part of the West Java Basin. Cibulakan formation on the main interval has constituent components in the form of a rift between sandstone and clay. Identification of reservoir distribution is done by correlating reservoir connectivity layer (sandstone) bounded by stratigraphic sequence marker. Characteristics and quality of the reservoir that developed in the study can be identified based on facies and sedimentation environment and petrophysical properties of each rock layer through geostatistical modeling. The method used in facies modeling uses a combination of Truncation Gaussian Simulation (TGS) and Sequential Indicator Simulation (SIS), while in petrophysical property modeling the method used is Sequential Gaussian Simulation (SGS) method. Based on the analysis of log data secondary stratigraphy, reservoir " R " can be divided into 8 layers of reservoirs that have the potential to contain hydrocarbons. The layer consists of reservoir layers R1, R2, R3, R4, R5, R6, R8 and R9. Facies analysis and Environmental Control the largest area of research can be found in Dangun marine environment with constituent facies include F1 (sandstone very good (VG) Porosity), F2 (sandstone good (G) Porosity), F3 (shally sand) and f4 (marine shale) associated with facies Tidal sand Ridges (TSR). The results of facies modeling using a combination method can describe the distribution of the reservoir in the research area well (histogram differential <5%), with the direction of the distribution of the reservoir is relatively northeast southwest (N 10o E s/d N 25o E with the percentage of the body layer of each reservoir around 20% to 60% of the total area of research. Petrophysical property modeling shows that R-4 reservoir has the potential to be developed further, this is because the characteristics of the reservoir has a dominant distribution of rock type 1 (RT-1) with porosity can reach 28% with SwJ (J function water saturation) of 32% and N/G (Net to Gross) 71%. Volumetric, R-4 reservoir contributes volumetric hydrocarbon of 128.8 MMSTB (Million Stock Tank Barrels) of Petroleum and 9.2 Bscf (Billions of Standard Cubic Feet) of natural gas (base case). The total calculation of volumetric base case reserves in 8 reservoir zones obtained reserves of 312.55 MMSTB of Petroleum and 60.99 BSCF of natural gas.

Keyword: *Geostatistic Model, Facies Model, Petrophysical Properties Model, Volumetric Hidrocarbon Estimate.*