INTISARI

Tiga reservoir Anggota Gita (34-1, 33-6, dan 33-4) menunjukkan produksi minyak yang terbatas, penurunan tekanan yang cepat, dan *recovery factor* yang rendah akibat *solution gas drive*. Pengembangan lapangan tahap selanjutnya membutuhkan model statik dan dinamik untuk mengurangi ketidakpastian dan penempatan sumur yang lebih akurat. Karakterisasi reservoir dilakukan untuk mengetahui fasies dan lingkungan pengendapan sebagai input pada model stastik reservoir dengan mengintegrasikan berbagai data seperti *core*, *wireline log*, atribut seismik, petrografi, dll. Korelasi sumur untuk menyebarkan marker sikuen stratigrafi dan diintegrasikan dengan atribut seismik untuk membuat *pie chart,* geometri reservoir*,* dan peta lingkungan pengendapan. Selanjutnya, model statik dibuat untuk menyebarkan fasies, *property* petrofisik, dan estimasi cadangan awal dan tersisa. Model petrofisik dibias model fasies. Analisis *uncertainty* dan *sensitivity* dilakukan untuk mendapatkan distribusi cadangan dan pengaruh variabel pemodelan terhadap nilai cadangan awal. Atribut seismik reservoir menunjukkan *distributary channel* dan *point bar.* Asosiasi fasies (FA) ini disusun oleh litofasies batupasir medium-halus *planar tabular cross bedding*, batupasir halus-sangat halus *mud drapes*, dan batupasir *ripple-wavy lamination*. Log sumur menunjukkan pola *fining upward*, batuan inti memperlihatkan *channel rip up clast* serta kontak erisonal atau kontak tegas dengan litologi di bawahnya. Struktur *mud drapes* pada batupasir *channel* mengindikasikan pengaruh pasang surut akibat lingkungan yang dekat dengan laut pada *lower delta plain.* Bentukan *channel* berarah barat-timur (34-1) dan selatan-utara (33-6 dan 33-4). Asosiasi fasies (FA) lain mencakup laut dangkal, rawa-rawa, *interdistributary bay*, dan *tidally influenced interdistributary bay*. Lingkungan pengendapan Anggota Gita daerah penelitian diinterpretasikan sebagai *tidally influenced delta*. Model struktur melibatkan 35 *top horizon* dan 101 patahan. Model fasies dan petrofisik menunjukkan FA *distributary channel* memiliki *property* petrofisik yang relatif lebih bagus. Reservoir 33-4, 33-6, dan 34-1 berturut turut memiliki rata-rata volume serpih 8%, 7%, dan 6%. Rata-rata porositas 29%, 29%, dan 28% Rata-rata saturasi air 44%, 50%, 41%. Permeabilitas rata-rata ketiga reservoir > 1 *Darcy*. Kontras dengan *property* petrofisik FA *interdistributary bay/tidally influenced interdistributary bay* yang memiliki *property* petrofisik relatif rendah dengan rata-rata volume serpih 90%, porositas 5%, dan permeabilitas 0,05 mD, saturasi air 95%. Estimasi STOOIP pada ketiga reservoir total sebesar $284x10^6$ bbl dan cadangan tersisa sebesar $226,5x10^6$ bbl. Masih terdapat 20% *additional reserves* sebesar $\pm 57,2x10^6$ yang dapat dikembangkan. Analisis *uncertainty* menghasilkan distribusi P90, P50, dan P10 STOOIP berturut-turut sebesar 276 $x10^6$, $297x10^6$, dan $310x10^6$ bbl. Cadangan tersisa berkisar 200,5-251,5 $x10^6$ bbl. Analisis *sensitivity* menunjukkan tiga variabel yang mempunyai pengaruh besar terhadap STOOIP adalah kontak fluida 6%-7%, proporsi fasies 4%-6%, dan model saturasi air 3%-4%.

Kata kunci: Anggota Gita, Sungai *Distributary*, Pemodelan Fasies, Pemodelan Petrofisik, Estimasi Cadangan,

ABSTRACT

Three Gita Member reservoirs 34-1, 33-6, and 33-4 produce from solution gas drive with rapid pressure decline and low recovery factor. After successful oil production enhancements through waterflooding injections prompt the need for a reservoir model in further field development. Reservoir characterization was needed to determine facies and depositional environment for input in facies modeling. The study integrated core, wireline log, petrophysical logs, seismic attribute, petrography, etc. Next, well correlation was carried out to distribute stratigraphic markers. Finally, seismic attribute and well correlation were integrated to construct pie chart and depositional environment map. Next, a static model was constructed to distribute facies, petrophysical, and evaluation of original and remaining reserves. Facies model was built using hierarchical approach and subsequently used as constrain in petrophysical modeling. Uncertainty analysis of reserves and sensitivity of modeling variables to STOOIP from static model were also analyzed. External geometry from seismic attribute revealed distributary channel with point bars which act as reservoir and consist of lithofacies medium-fine grained planar tabular cross bedding sandstone, mud drapes sandstone, and ripple-wavy lamination sandstone. Wireline log showed fining-upward pattern, abundant channel rips up clast, and core sample displayed sharp and erosional contact with underlying lithology. Frequent mud drapes indicate tidal influence near marine environment probably in lower delta plain. Channels are trending west-east for 34-1 reservoir and north-south for 33 series reservoirs. Other facies associations are shallow marine, swamp, and interdistributary bay, and tidally influenced interdistributary bay. Overall, the studied Gita Members were deposited in tidally influenced delta. Structural model was build involving 35 top horizons and 101 faults. Petrophysical model biased by facies model shows relationship between facies association and petrophysical properties. Distributary channel FA exhibits better petrophysical values. Reservoirs channel 33-4, 33-6, and 34-1 respectively have average shale volume of 8%, 7%, and 6%. Average porosity 29%, 29%, and 28%. Average water saturation 44%, 50%, 41%. Average permeability of the three reservoirs > 1 Darcy. In contrast, petrophysical properties of FA interdistributary bay/tidally influenced interdistributary bay indicate relatively low values with average shale volume of 90%, porosity 5%, permeability 0.05 mD, and water saturation 95%. Estimated STOOIP in the three reservoirs totals 284x10^6 barrels and remaining reserves amount to 226,5x10^6 bbl. There's still an opportunity for 20% additional incremental reserves ±57,2x10^6 bbl. Uncertainty analysis yields P90, P50, and P10 distributions of STOOIP respectively 276x10^6, 297x10^6, and 310x10^6 bbl. Remaining reserves range from 200.5x10^6-251.5 x10^6 bbl. From sensitivity analysis three variables with significant influence on STOOIP calculation are fluid contacts (6%-7%), facies proportion fraction (4%-6%), and water saturation model. (3%-4%).

Keywords: Gita Member, Distributary Channel, Facies Model, Petrophysical Model, Reserves Estimation.