

SARI

HASIL EVALUASI MODEL SEAM UNTUK ESTIMASI CADANGAN BATUBARA DI MELAK, KABUPATEN KUTAI BARAT, KALIMANTAN TIMUR

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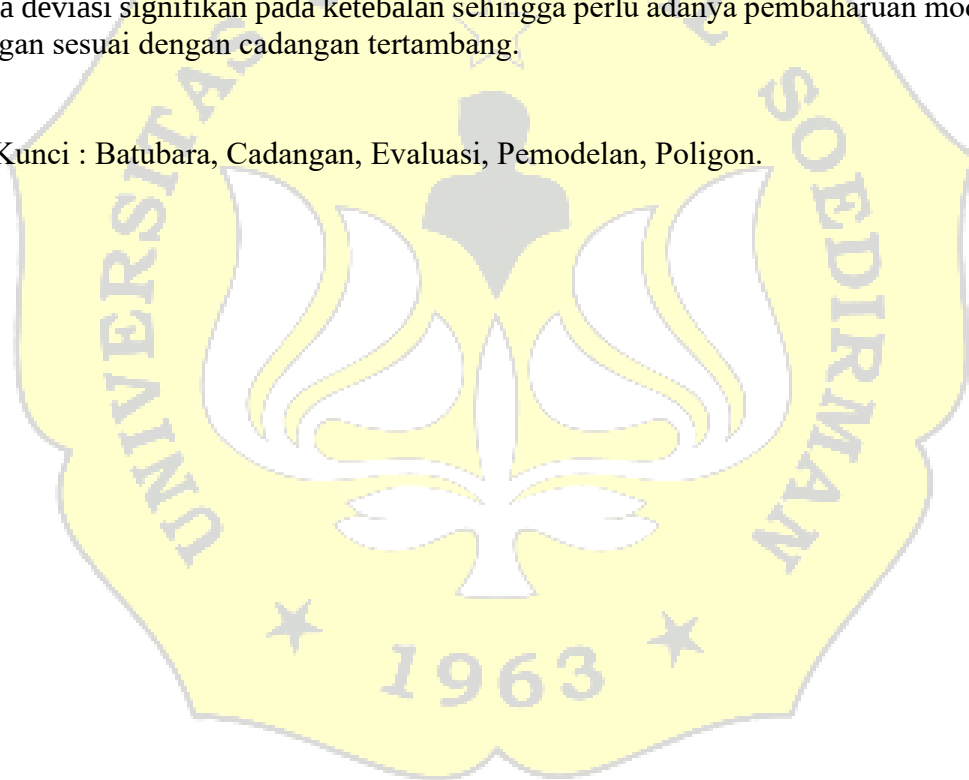
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Peningkatan revolusi industri yang signifikan menyebabkan lonjakan permintaan pasokan energi dunia, salah satunya komoditas batubara yang masih eksis menjadi sumber energi di berbagai negara. Hal tersebut menyebabkan target produksi batubara Indonesia dari tahun ke tahun meningkat. Salah satu daerah dengan kekayaan batubara yang melimpah yaitu Melak, Kabupaten Kutai Barat, Provinsi Kalimantan Timur. Penelitian ini dilakukan untuk mengevaluasi pemodelan lapisan batubara di lokasi penelitian yang diharapkan dapat meminimalisir deviasi (posisi *roof*, *floor*, ketebalan, dan tonnase batubara) sehingga model batubara semakin akurat untuk dijadikan acuan rencana penambangan selanjutnya sekaligus dalam rangka meningkatkan konservasi cadangan di lokasi penelitian. Metode yang digunakan dalam penelitian ini yaitu pemetaan area PIT (*blok-strip* “PIT Shell 2025”) meliputi pengamatan geomorfologi, pengamatan dan pengukuran lapisan batubara, dan struktur geologi. Hasil pemetaan tersebut dikorelasikan dengan hasil korelasi sumur pemboran dan kajian terdahulu. Kemudian, analisis studio berupa pembuatan peta-peta, penampang sayatan, perhitungan volumetrik dan tonnase menggunakan metode poligon serta laporan akhir. Fisiografis lokasi penelitian dominan berada pada dataran bergelombang sedang, jenis batuan dominan lokasi penelitian yaitu batuan sedimen dengan arah jurus dominan timur laut-barat daya dengan *dip* 0°–2° ke arah tenggara. Morfologi daerah penelitian dibagi menjadi 5 satuan yaitu Satuan Bergelombang Lemah Denudasional Rendah (D.1), Satuan Bergelombang Kuat Denudasional Sedang (D.2), Satuan Dataran Banjir (F.3), dan Satuan *Excavation PIT* (E.1) dengan pola aliran yang berkembang yaitu parallel dan dendritik. Sedangkan, tipe genetik sungai yang berkembang yaitu obsekuen, resekuen, dan subsekuen. Satuan Stratigrafi lokasi penelitian dibagi menjadi 3 satuan (tertua hingga termuda) yaitu Satuan Perselingan Batupasir-Batulempung Sisipan Batubara yang menjemari dengan Satuan Perselingan Batupasir-Batulanau Sisipan Batubara. Kedua satuan tersebut disetarakan dengan Formasi Kampungbaru bagian tengah – atas. Satuan termuda yaitu Endapan Alluvial yang disetarakan dengan Alluvial. Lokasi penelitian berada pada area yang bergelombang yang dipengaruhi oleh kompresi berarah barat laut-tenggara yang berkaitan dengan pengangkatan terakhir Tinggian Kuching dan keterbentukan *mahakam folding belt*. Kondisi tersebut juga menyebabkan terbentuknya sesar naik berorientasi barat daya – timur laut. *Release compressional* dan pembebanan sedimen memicu terbentuknya sesar turun dan mendatar mengangan di lokasi penelitian. Selain itu, pengaruh struktur geologi juga menyebabkan adanya anomali nilai kemiringan lapisan (*dip*) yang berkisar antara 13°–53°. *Block-Strip* “PIT Shell 2025” *in-model* memiliki 2 seam, yaitu seam B dan seam A mengalami *simple splitting* A1 dan A2 dengan cadangannya yaitu 1.087.708,08 ton, 17.686.753,66 ton, 1.232.419,90 ton, 2.387.937,98 ton. *Total coal tonnes in-model* yaitu 22.394.819,62 ton dengan *total waste* sebesar

84.153.194,88 BCM sehingga *Stripping Ratio (SR)* in-model sebesar 1:3,76. Kondisi evaluasi *blok-strip "PIT Shell 2025"* menunjukkan geometri *multiple splitting coal* dari seam A akibat sering terjadinya pembanjiran rawa yang berulang sehingga terbentuknya seam A, seam A1, seam A2, seam A3 dan seam B dengan cadangannya yaitu 23.052.916,90 ton, 241.087,12 ton, 108.457,04 ton, 1.869.511,75 ton, dan 103.896,66 ton. *Total coal tonnes evaluasi* yaitu 25.375.869,47 ton dengan *total waste* sebesar 81.099.209,75 BCM sehingga *Stripping Ratio (SR)* aktual yaitu 1:3,20. Berdasarkan perhitungan cadangan *PIT Shell 2025*, Seam A menunjukkan deviasi positif sebesar 5.366.163,24 ton, sedangkan Seam A1 dan Seam A2 masing-masing tercatat deviasi negatif sebesar 991.333 ton dan 2.279.481 ton. Seam A3 dianggap setara dengan estimasi dalam model untuk Seam B, menghasilkan deviasi positif sebesar 781.803,67 ton. Selain itu, Seam B diidentifikasi sebagai lapisan baru yang dievaluasi dalam area "*PIT Shell 2025*", dengan cadangan diperkirakan mencapai 103.896,66 ton. Berdasarkan perhitungan cadangan yang ditambah melalui *joint survey*, nilai *recovery* batubara ditentukan untuk lima batasan, yaitu: Poligon 1 sebesar 96,71%, Poligon 2 sebesar 92,33%, Polygon 3 sebesar 100,46%, Seam A3–Poligon 1 sebesar 2748,27%, dan Seam A3–Poligon 2 sebesar 124,08%. Nilai *recovery* yang melebihi 100% menunjukkan adanya deviasi signifikan pada ketebalan sehingga perlu adanya pembaharuan model dan cadangan sesuai dengan cadangan tertambang.

Kata Kunci : Batubara, Cadangan, Evaluasi, Pemodelan, Poligon.



ABSTRACT

SEAM MODEL EVALUATION RESULTS FOR ESTIMATING COAL RESERVES IN MELAK, WEST KUTAI REGENCY, EAST KALIMANTAN

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The significant increase in the industrial revolution led to a rise in demand for the world's energy supply, particularly coal, which is still used as a source of energy in various countries. This causes Indonesia's coal production target to increase from year to year. One area with abundant coal deposits is Melak, West Kutay Regency, East Kalimantan Province. This research was conducted to evaluate the coal seam modelling at the research location, aiming to minimize deviations (roof, floor, thickness, and coal tonnage) in order to ensure that coal models will be more accurate for future mining plans and increase reserve conservation at the research location. The method used in this research is mapping the PIT area (block-strip "PIT Shell 20205"), including geomorphological observations, coal seam observations and measurements, and geological structures. The results of the mapping were correlated with the results of well drilling and previous research. Furthermore, studio analysis was carried out in order to create maps, cross-sections, volumetric and tonnage calculations using the polygon method and the final report. The research location's physiography is primarily on a moderately undulating plain; the rock type found there is sedimentary rock, which has a dip of 0°–2° to the southeast and a prominent northeast–southwest strike orientation. The morphology of the research location is divided into 5 units: Low Denudational Weak Undulating Unit (D.1), Moderate Denudational Strong Undulating Unit (D.2), Floodplain Unit (F.3), and Excavation PIT Unit (E.1) with flow patterns of parallel and dendritic. Furthermore, the river's genetic types are obsequent, resequent, and subsequent. The stratigraphy unit of the research location is divided into 2 units (oldest to youngest): sandstone-claystone interbedded with coal layers unit that interfingers with the sandstone-siltstone interbedded with coal layers unit. These units are equivalent to the middle-upper Kampunbaru Formation. The youngest unit is Alluvial Deposits, equivalent to Alluvial. The research location is in an undulating area that was affected by northwest–southeast-oriented compressional forces associated with the last uplift of the Kuching High and establishment of the Mahakam folding belt. These conditions also led to the formation of southwest-northeast-oriented reverse faults. Compressional release and overpressure sediment, which led to the formation of normal faults and dextral strike-slip faults at the research location. Furthermore, the influence of geological structures has resulted in anomalous dip values ranging from 13° – 53°. Block-Strip "PIT Shell 2025" in-model has two seams: seam B and seam A, which has a simple splitting into A1 and A2, with reserves of 1.087.708,08 tons, 17.686.753,66 tons, 1.232.419,90 tons, and 2.387.937,98 tons. Total coal in-model is 22.394.819,62 tons, with total waste of 84.153.194,88 BCM, resulting in a stripping

ratio (SR) in-model of 1:3,76. The evaluation condition of the block-strip “PIT Shell 2025” shows that the geometry of multiple coal seam splittings originated from Seam A. This condition resulted from frequent swamp flooding, which led to the formation of separate seams: Seam A, Seam A1, Seam A2, Seam A3, and Seam B. The corresponding coal reserves for each seam are as follows: 23.052.916,90 tons for Seam A; 241.087,12 tons for Seam A1; 108.457,04 tons for Seam A2; 1.869.511,75 tons for Seam A3; and 103.896,66 tons for Seam B. The total estimated coal reserve amounts to 25.375.869,47 tons, with an associated total waste volume of 81.099.209,75 BCM, resulting in an actual stripping ratio (SR) of 1:3,20. Based on the PIT Shell 2025 reserve calculations, Seam A shows a positive deviation of 5.366.163,24 tons, while Seams A1 and A2 have negative deviations of 991.333 tons and 2.279.481 tons, respectively. Seam A3 is considered equivalent to the in-model estimate for Seam B, resulting in a positive deviation of 781.803,67 tons. Furthermore, Seam B is identified as a newly evaluated seam within the “PIT Shell 2025” area, with an estimated reserve of 103.896,66 tons. Based on joint-survey calculations of mined reserves, coal recovery rates were determined for five boundaries: Polygon 1 at 96,71%, Polygon 2 at 92,33%, Polygon 3 at 100,46%, Seam A3–Polygon 1 at 2748,27%, and Seam A3–Polygon 2 at 124,08%. Recovery values exceeding 100% indicate significant deviations in thickness, suggesting that the geological model and reserve estimates require updating to accurately reflect the actual mined reserves.

Keywords : Coal, Reserves, Evaluation, Modelling, Polygon.

