ABSTRAK

GEOLOGI DAN HUBUNGAN KARAKTERISTIK FISIK BATUBARA BERDASARKAN LINGKUNGAN PENGENDAPAN DAERAH SEPARI, KEC. TENGGARONG SEBERANG, KAB. KUTAI KARTANEGARA, KALIMANTAN TIMUR

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Ketidakseragaman variasi karakteristik fisik batubara merekam kondisi pembentukan gambut untuk mendukung penafsiran lingkungan pengendapan batubara, sehingga pemahaman faktor pengendalinya menjadi kunci untuk memprediksi sebaran batubara serta mendukung dalam kegiatan eksplorasi. Formasi Balikpapan Daerah Separi belom terpetakan secara terpadu pada Lingkungan pengendapan. Penelitian ini bertujuan mengidentifikasi kondisi geologi daerah penelitian, menganalisis karakteristik fisik batubara, menafsirkan lingkungan pengendapannya, dan mengungkap hubungan sistematik di antara keduanya. Metode penelitian mencakup pemetaan geologi permukaan, analisis data *well logging*, analisis maseral, serta identifikasi palinologi. Seluruh data tersebut diintegrasikan melalui interpretasi litofasies dan diagram fasies batubara TPI-GI serta GWI-VI. Hasil penelitian menunjukkan bahwa daerah penelitian tersusun atas dua satuan batuan tak resmi dalam Formasi Balikpapan berumur Miosen Tengah, yaitu Satuan Batupasir dan Satuan batulempung Balikpapan. Pada daerah tersebut berkembang sesar naik Separi bertipe *left reverse slip fault*. Batubara terekam pada enam *seam*, yakni *seam* 1, 2, 4, 9, 10, dan 11, dengan delapan litotipe yang mencerminkan ragam kondisi pembentukannya. Komposisi maseral didominasi vitrinit dengan collodetrinit sebagai penyusun utama dan menghasilkan nilai GI yang tinggi (0,2–52,54) nilai tersebut menandakan gelifikasi intensif pada lingkungan pengendapan *marsh wet* memiliki tingkat oksigen yang rendah dikarenakan genangan air yang tinggi menciptakan kondisi anoksik (minim oksigen). Sistem pengendapan ditafsirkan sebagai *lower delta plain* yang dicirikan oleh empat asosiasi fasies, yaitu *channel*, *interdistributary bay*, *crevasse splay*, dan *swamp*, serta diperkuat oleh asosiasi palinologi penciri *back mangrove*. Karakteristik fisik batubara mencerminkan lingkungan pengendapannya terhadap keberadaan litotipe *bright coal* dan *banded bright coal* yang kaya vitrinit terbentuk pada rawa stabil, sedangkan *dull coal*, *shaly coal*, dan *claystone* berpengotor tinggi berkembang pada *interdistributary bay*. Pirit *framboidal* pada *seam* 1, 9, dan 11 merekam intrusi air laut pada lingkungan anoksik.

Kata Kunci: Batubara, Formasi Balikpapan, Litotipe, Maseral.

ABSTRACT

GEOLOGY AND THE RELATIONSHIP OF PHYSICAL COAL CHARACTERISTICS BASED ON DEPOSITIONAL ENVIRONMENT, SEPARI AREA, TENGGARONG SEBERANG DISTRICT, KUTAI KARTANEGARA REGENCY, EAST KALIMANTAN

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The heterogeneity of coal physical characteristic variations records peat-forming conditions to support the interpretation of coal depositional environments, so that understanding its controlling factors becomes the key to predicting coal distribution and supporting exploration activities. The Balikpapan Formation in the Separi Area has not been comprehensively mapped in terms of its depositional environment. This study aims to identify the geological conditions of the research area, analyze the physical characteristics of coal, interpret its depositional environment, and reveal the systematic relationship between the two. The research methods include surface geological mapping, well logging data analysis, maceral analysis, and palynological identification. All data were integrated through lithofacies interpretation and coal facies diagrams of TPI-GI and GWI-VI. The results indicate that the research area is composed of two informal rock units within the Middle Miocene Balikpapan Formation, namely the Balikpapan Sandstone Unit and the Balikpapan Claystone Unit. A left reverse slip fault type of Separi thrust fault develops within the area. Coal is recorded in six seams, namely seams 1, 2, 4, 9, 10, and 11, with eight lithotypes reflecting various formation conditions. The maceral composition is dominated by vitrinite with collodetrinite as the main constituent, producing high GI values (0.2–52.54); these values indicate intensive gelification in a marsh wet depositional environment characterized by low oxygen levels due to high water inundation creating anoxic conditions. The depositional system is interpreted as a lower delta plain characterized by four facies associations, namely channel, interdistributary bay, crevasse splay, and swamp, further supported by back mangrove palynological associations. The physical characteristics of coal reflect its depositional environment, as evidenced by the presence of bright coal and banded bright coal lithotypes rich in vitrinite formed in stable swamp settings, whereas dull coal, shaly coal, and highly impure claystone developed in the interdistributary bay. Framboidal pyrite in seams 1, 9, and 11 records marine water intrusion in an anoxic environment.

Keywords: *Balikpapan Formation, Coal, Lithotype, Maceral.*