SARI

Fly ash dan *bottom ash* (FABA) adalah limbah pembakaran batubara dari PLTU yang dapat diubah menjadi produk yang meningkatkan nilai guna dan mengurangi penumpukan limbah. Potensi dari FABA dapat digunakan dalam beberapa hal khususnya dalam bidang material konstruksi. Dalam pemanfaatan lebih lanjut, FABA digunakan sebagai pengganti semen dalam pembuatan beton geopolimer. Namun, kandungan *unburned carbon* (UC) pada FABA menjadi salah satu parameter yang mempengaruhi kualitas beton geopolimer. Penelitian terkait karakteristik serta potensi dari batubara umpan dan FABA pada daerah Tabalong, Kalimantan Selatan belum dilakukan. Penelitian ini bertujuan untuk mengetahui karakteristik batubara umpan dan FABA, perubahan komposisi batubara sebelum dibakar dan setelah dibakar, dan potensinya. Metode penelitian yang digunakan dalam penelitian ini adalah petrografi organik, XRD, ICP MS & ICP AES, dan analisis *proksimate ultimate*.

Batubara umpan pada daerah penelitian memiliki peringkat *lignite* C - *subbituminous* dengan persentase *moisture* sebesar 24,9 – 30,59 %, *ash* sebesar 2,21 - 8%, *volatile matter* 36,65 – 37,52%, *fixed carbon* 28,97 – 30,55%, nilai kalor 4310 – 4516 btu/lb, karbon sebesar 67,48 – 69,97%, hidrogen sebesar 5,04 – 5,56%, nitrogen sebesar 1,07 – 1,28%, oksigen sebesar 23,92 – 25,38%, dan sulfur sebesar 0,15 – 0,41%. Kandungan maseral *huminite* 46,9% - 56,8%vol, kelompok *liptinite* 22,6% - 29,2%vol, kelompok *inertinite* 14,1 - 16,3%, mineral 6 – 9,6%vol. FABA pada daerah penelitian tergolong kedalam 3 bagian, 2 sampel FABA yang tergolong pada kelas F, terdapat 4 sampel FABA yang tergolong pada kelas C, dan terdapat 5 sampel FABA yang tidak tergolong kelas apapun. Perubahan komponen batubara dan FABA diamati melalui data proksimat, data senyawa oksida utama sebelum dan sesudah dinormalisasi LOI, dan data petrologi organik. Terdapat beberapa komponen batubara yang mengalami penambahan dan pengurangan kelimpahan sebelum batubara dibakar dan setelah menjadi FABA. FABA kelas F memiliki potensi kuat tekan sebesar 21,97 Mpa dan FABA kelas C memiliki potensi kuat tekan sebesar 18 – 46 Mpa

Kata kunci: FABA, batubara umpan, transformasi, geopolimer, kuat tekan

ABSTRACT

Fly ash and bottom ash (FABA) are by-products of coal combustion from coal-fired power plants (PLTU) that can be transformed into products of higher utility value, reducing waste accumulation. FABA has potential applications, particularly in construction materials. For further utilization, FABA is used as a cement substitute in producing geopolymer concrete. However, the unburned carbon (UC) content in FABA is a parameter that influences the quality of geopolymer concrete. Research on the characteristics and potential of feed coal and FABA in the Tabalong area, South Kalimantan, has not yet been conducted. This study aims to determine the characteristics of feed coal and FABA, the compositional changes in coal before and after combustion, and their potential. The research methods used include organic petrography, X-ray diffraction (XRD), inductively coupled plasma mass spectrometry (ICP-MS), inductively coupled plasma atomic emission spectrometry (ICP-AES), and proximate and ultimate analysis.

The feed coal in the study area is classified as lignite C to sub-bituminous rank, with a moisture content ranging from 24.9% to 30.59%, ash content from 2.21% to 8%, volatile matter from 36.65% to 37.52%, fixed carbon from 28.97% to 30.55%, calorific value between 4310 and 4516 Btu/lb, carbon content from 67.48% to 69.97%, hydrogen content from 5.04% to 5.56%, nitrogen content from 1.07% to 1.28%, oxygen content from 23.92% to 25.38%, and sulfur content from 0.15% to 0.41%. The maceral content consists of huminite ranging from 46.9% to 56.8% vol, liptinite group from 22.6% to 29.2% vol, inertinite group from 14.1% to 16.3%, and minerals from 6% to 9.6% vol. The FABA (Fly Ash and Bottom Ash) in the study area is classified into three groups: two FABA samples fall into Class F, four samples fall into Class C, and five samples are unclassified. Changes in coal and FABA components were observed through proximate analysis data, major oxide compound data before and after LOI normalization, and organic petrology data. Several coal components showed increased or decreased abundance before combustion and after becoming FABA. Class F FABA has a compressive strength potential of 21.97 MPa, while Class C FABA has a compressive strength potential ranging from 18 to 46 MPa.

Keywords: FABA, *feed coal, transformation, geopolymer, compressive strength*