STUDI GEOLOGI DAN INDIKASI KETERDAPATAN GAS BIOGENIK BERDASARKAN HASIL PENAFSIRAN REKAMAN STRATA BOX DI DELTA MUSI, DAERAH SUNGSANG, KECAMATAN BANYUASIN II, KABUPATEN BANYUASIN, PROVINSI SUMATERA SELATAN

SARI

Peningkatan permintaan energi akibat bertambahnya jumlah penduduk tidak seimbang dengan jumlah cadangan yang ada, pemanfaatan sumber energi baru yang murah, efisien, ramah lingkungan dan mudah diolah berupa gas biogenik menjadi salah satu alternatif dalam mengatasi defisit akan bahan bakar fosil. Delta Musi daerah Sungsang, Kecamatan Banyuasin II, Kabupaten Banyuasin, Sumatera Selatan sebagai salah satu daerah yang berpotensi keterdapatan dari gas biogenik. Metode yang dilakukan yaitu pemetaan karakteristik pantai, pengambilan contoh sedimen permukaan laut, perekaman seismik *strata box*, pemboran tangan di daratan, pemboran inti, analisis bakteri metanogenik dan *Total Organic Carbon* (TOC), pengamatan gas dilapangan. Kondisi morfologi berupa dataran yang dipengaruhi pasang surut pada kawasan delta bertipe *fluvial – tide dominated delta* yang ditumbuhi bakau berjenis *Rhizopora* dan *Avicennia* dan ditumbuhi nipah yang menjadi tempat ideal untuk terbentuk dan menjaga eksistensi gas biogenik pada lapisan sedimen. Hasil analisis rekaman seismik *strata box* menunjukkan terdapat kantong – kantong gas pada lapisan sedimen runtunan A pada wilayah timur laut dan runtunan B pada wilayah utara-selatan-barat daerah penelitian. Hasil deskripsi data bor inti menujukkan keberadaan material organik melimpah berupa cangkang kerang, *Foraminifera*, gambut, dan kayu berbentuk fragmen hingga lembaran yang mengindikasikan keberadaan potensi batuan induk gas biogenik. Keberadaan gas biogenik didukung dengan keberadaan bakteri metanogen berupa *Methanobacterium bryantii*, *Methanoplanus endosimbiosus dan Methanobacterium ivanovii* berjumlah $3{,}2 \times 10^4$ - $1{,}0 \times 10^5$ (CFU/gram) dan juga hasil analisis *Total Organic Carbon* (TOC) pada kedua data pemboran inti menunjukkan keberadaan *Detrovitrinite (Humodetrinite)* berkisar 2,6 % - 14 % bernilai *good – excellent source rock*. Hasil rekaman seismik *strata box* diperkuat dengan data pemboran inti dan analisis TOC menunjukkan keberadaan *source rock* berupa lanau muda, lanau tua, sisipan lempung, dan lempung tua, *reservoir* pada lapisan lanau muda dan *seal* pada lapisan lumpur dan lempung. Dari lubang bor gelembung gas dapat diamati dan dilakukan uji nyala api, sehingga gas tersebut layak digunakan sebagai deposit energi alternatif.

Kata Kunci: geologi, gas biogenik, energi alternatif, Delta Musi, *strata box*, bakteri metanogenik, *Total Organic Carbon*

GEOLOGICAL STUDIES AND INDICATION OF BIOGENIC GAS EXISTENCE BASED ON INTERPRETATION OF STRATA BOX ACQUISITION IN MUSI DELTA, SUNGSANG REGION, BANYUASIN II SUBDISTRICT, BANYUASIN REGENCY, SOUTH SUMATERA PROVINCE

ABSTRACT

Increasing energy demand due to the increasing population is not balanced with the amount of available reserves, the utilization of new energy sources are cheap, efficient, environmental friendly and easy to process in the form of biogenic gas to be an alternative in overcoming the deficit of fossil fuels. Delta Musi of Sungsang District, Banyuasin II Subdistrict, Banyuasin Regency, South Sumatera as one of the potentially areas of biogenic gas existence. The applied methods were mapping of coastal characteristics, took samples of sea surface sediments, strata box seismic recording, hand drilling on land, core drilling, analyzed the existence of methanogenic bacterias and Total Organic Carbon (TOC), gas field observation. The morphological conditions in the form of plain area, influenced by tidal process in delta areas which classified as fluvial - tide dominated delta type and overgrown mostly by mangroves of *Rhizopora* and *Avicennia* and nipah as grown to become the ideal places to form and maintain the existence of biogenic gas in the sediment layers. The result of strata box seismic recording analysis showed that there were gas pockets in the sediment layer A in the northeast region and in the sedimen layer B in the north-south-west region of the research area. The result of the description of core drill data showed the presence of abundant organic materials in the form of shells, *Foraminifera*, peat, and fragmented woods up to sheets indicating potential source rocks of biogenic gas. The presence of biogenic gas is supported by the presence of methanogenic bacterias such as *Methanobacterium bryantii*, *Methanoplanus endosimbiosus* and *Methanobacterium ivanovii* in the amount of 3.2×10^4 - 1.0×10^5 (CFU/gram) and also the Total Organic Carbon (TOC) analysis results in both core drilling data showed the presence of *Detrovitrinite* (*Humodetrinite*) ranges from 2.6% - 14% which is categorized as good - excellent source rock. Structural seismic tape recordings reinforced with core drilling data and TOC analysis showed the existence of source rock in the form of young silts, old silts, clays inset, and old clays, reservoirs in young silt layers and seals or cap rock in layers of muds and clays. From the drill holes gas bubbles can be observed and tested flame, so the gas in the research areas are suitable for use as an alternative energy deposits.

Keywords: geology, biogenic gas, alternative energy, Musi Delta, strata box, methanogenic bacteria, Total Organic Carbon