

## ABSTRACT

The study area is located the Tempuran Village area within Rembang Zone, western part of northeast Java Basin. This research focused on the sedimentological characteristics and reservoir potential of Ngrayong sandstone base on the analytical results of granulometry, petrography, petrophysic, paleontology and XRD, taken from samples of eight measured stratigraphic sections. Ngrayong sandstone is mainly composed by siliciclastic tide dominated shelf and shallow marine shelf sediments. They are mainly consist of poorly sorted to very well sorted, angular to poorly rounded, matrix or grain supported of very fine to fine grained siliciclastic sandstone and they are intercalated with calcareous claystone, laminated shales and bioclastic limestones. The uppermost part of Ngrayong Formation is covered by bioclastic limestone. Based on the stratigraphic measurements from the eight sections, eight lithofacies were identified; thick-bedded to massive sandstone facies (Fc.1), laminated to thin bedded sandstone facies (Fc.2), calcareous sandstone facies (Fc.3), cross-bedded sandstone facies (Fc.4), coal facies (Fc.5), calcareous claystone facies (Fc.6), ) bioclastic limestone facies (Fc.7) and laminated shales facies (Fc.8). Three lithofacies association can be grouped; coastal (lagoon) sediment association, tide dominated shelf sediment association and shallow marine shelf sediment association. According to the results of granulometry analysis, sedimentological characteristics, lateral and vertical distribution of strata, four sandstone facies (Fc. 1, Fc. 2, Fc.3 and Fc.4) possess good to excellent porosity (16.26% to 29.28%) and excellent permeability (263.813mD- 2088.03mD) and fair textural maturity. Thus all of sandstone facies can be recognized as reservoir potential. But the best reservoir potential facies is cross-bedded sandstone facies, the second one is thick bedded to massive sandstone facies, third one is laminated to thin bedded sandstone facies and the last one is calcareous sandstone facies. The age of Ngrayong Formation can be assigned as Middle Miocene by the occurrence of large foraminifera assemblage such as *Cycloclypeus* sp., *Lepidocyclina* sp. within bioclastic limestone.

**Keywords:** Ngrayong Sandstone, Tempuran Area, Lithofacies, depositional environment, reservoir quality

## SARI

Wilayah penelitian terletak di Desa Tempuran dan sekitarnya, termasuk dalam Zona Rembang, bagian barat cekungan Jawa Timur utara. Penelitian ini difokuskan pada karakteristik sedimentologi dan potensi reservoir Batupasir Ngrayong berdasarkan hasil analisis granulometri, petrografi, petrofisika, paleontologi dan XRD, dari sampel yang diambil pada delapan jalur pengukuran stratigrafi. Batupasir Ngrayong terutama terdiri dari endapan sedimen silisiklastik hasil endapan pada daerah pasang surut dan laut dangkal. Batupasir tersebut terutama tersusun oleh batuan dengan sortasi jelek sampai bagus, butiran yang menyudut sampai membulat tanggung, ukuran butir pasir halus sampai sedang dengan tekstur terdukung matriks atau butiran, dimana suksesi batuan ini disisipi oleh batulempung karbonatan, serpih berlaminasi dan batugamping bioklastik. Bagian paling atas dari Formasi Ngrayong ditutupi oleh batugamping bioklastik. Berdasarkan pengukuran stratigrafi dari delapan jalur, delapan lithofacies diidentifikasi yaitu; *thick-bedded to massive sandstone facies (Fc.1)*, *laminated to thin bedded sandstone facies (Fc.2)*, *calcareous sandstone facies (Fc.3)*, *cross-bedded sandstone facies (Fc.4)*, *coal facies (Fc.5)*, *calcareous claystone facies (Fc.6)*, *bioclastic limestone facies (Fc.7)* and *laminated shales facies (Fc.8)*. Litofacies tersebut selanjutnya dapat dikelompokkan menjadi tiga asosiasi fasies, yaitu asosiasi fasies laguna, paparan dominasi pasang surut dan laut dangkal. Mengacu pada hasil analisis granulometri, karakteristik sedimentology batuan, distribusi lapisan secara lateral dan vertikal, empat fasies batupasir (Fc.1, Fc.2, Fc.3 dan Fc.4) memiliki porositas yang baik dan sangat baik (16,26% sampai 29,28%) dan permeabilitas yang sangat baik (263.813mD- 2088.03mD) dan kematangan tekstur yang sedang. Dengan demikian semua fasies batupasir dapat dikenali sebagai potensi reservoir. Tapi fasies yang berpotensi sebagai reservoir terbaik adalah batupasir berlapis silang, yang kedua adalah batupasir massif atau berlapis tebal, yang ketiga berupa batupasir berlaminasi – berlapis tipis, dan yang terakhir adalah batupasir karbonatan Umur Formasi Ngrayong diperkirakan adalah Miosen Tengah

dengan adanya kumpulan foraminifera besar seperti *Cycloclypeus sp.*, atau *Lepidocyclina sp.* pada batugamping bioklastik.

**Kata kunci:** Batu pasir Ngrayong, Daerah Tempuran, Lithofacies, lingkungan pengendapan, kualitas waduk