

SARI

PEMODELAN STRUKTUR GEOLOGI BERDASARKAN DATA SEISMIK 3D DAN WELL: STUDI KASUS *GJØA FIELD, NORTH SEA*

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Lapangan Gjøa terletak di Laut Utara Norwegia, berjarak ± 30 km dari Pantai Barat Norwegia dengan luas wilayah penelitian 306,25 km². Lapangan ini berada pada area Horda Platform yang terbentuk akibat *multi-phase rifting* yang terjadi selama zaman Permian – Triasik Akhir (fase *rifting* 1) dan zaman Jurasik (fase *rifting* 2). Penelitian ini bertujuan untuk mengetahui kondisi geologi daerah penelitian, meliputi stratigrafi, model struktur geologi serta evolusi model pada daerah penelitian. Objek penelitian terletak pada interval formasi Statfjord dengan fokus penelitian berada di sumur 35/9-2. Data yang digunakan terdiri dari data seismik 3D dan data sumur. Metode yang digunakan dalam penelitian ini yakni analisis evaluasi formasi, analisis seismik, pemodelan struktur geologi, analisis ketebalan dan analisis palinspatik. Stratigrafi daerah penelitian termasuk ke dalam Formasi Statfjord, terdiri dari litologi Batupasir dan Serpih. Berdasarkan hasil evaluasi formasi, hidrokarbon yang terdapat pada interval penelitian yakni berupa Minyak. Struktur geologi bawah permukaan ditentukan berdasarkan analisis dari data seismik *xline* berarah Barat – Timur. Interpretasi data seismik dan log menunjukkan daerah penelitian memiliki struktur sesar-sesar normal yang berarah Utara – Selatan dan Timur Laut – Barat Daya sebagai produk dari *multi-phase rifting* pada zaman Triasik hingga Jurasik. Berdasarkan hasil analisis palinspatik didapatkan nilai strain pada zaman Triasik Akhir (*Statfjord Group*) yakni 5,59%, Jurasik Awal (*Dunlin Group*) 3,92%, Jurasik Tengah (*Brent Group*) 3,72%, Jurasik Akhir (*Viking Group*) 2,75%, Kapur Awal (*Cromer Knoll Group*) 0,13%, Kapur Akhir (*Shetland Group*) 0,10%, Tersier (*Hordaland Group*) 0,09% serta Tersier Akhir – Kuartar (*Nordland Group*) 0,06%. Berdasarkan hasil analisis strain tersebut diinterpretasikan pada zaman Triasik Akhir merupakan aktifitas *rifting* dengan fasa pemanjangan yang paling signifikan. Kemudian nilai strain yang rendah diinterpretasikan sebagai efek dari proses *thermal subsidence*.

Kata kunci: Lapangan Gjøa, Seismik 3D, Pemodelan Struktur Geologi, Analisis Palinspatik.

ABSTRACT

GEOLOGICAL STRUCTURE MODELING BASED ON 3D SEISMIC AND WELL DATA: CASE STUDY GJØA FIELD, NORTH SEA

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The Gjøa Field is located in the North Sea of Norway, ±30 km from the West Coast of Norway with area of research 306.25 km². This field is located in Horda Platform area which was formed as a result of multi-phase rifting that occurred during the Permian – Late Triassic period (rifting phase 1) and the Jurassic period (rifting phase 2). This study aims to determine the geological conditions of the research area, including stratigraphy, geological structure models and the evolution models in research area. The object of this research is located at interval of the Statfjord formation with focus of research being at 35/9-2 well. The data used consists of 3D seismic data and well data. The methods used in this research are formation evaluation analysis, seismic analysis, geological structure modeling, thickness analysis and palinspathic analysis. Stratigraphy of the study area belongs to the Statfjord Formation, consisting of Sandstone and Shale lithology. Based on the results of formation evaluation, the hydrocarbons contained in the research interval are in the form of oil. The subsurface geological structure was determined based on analysis of xline seismic data trending West – East. Interpretation of seismic and log data shows that the study area has normal fault structures with a North – South and North East – Southwest trending as a product of multi-phase rifting in the Triassic to Jurassic epochs. Based on the results of the palinspathic analysis, the strain values in the Late Triassic (Statfjord Group) were 5.59%, Early Jurassic (Dunlin Group) 3.92%, Middle Jurassic (Brent Group) 3.72%, Late Jurassic (Viking Group) 2.75%, Early Cretaceous (Cromer Knoll Group) 0.13%, Late Cretaceous (Shetland Group) 0.10%, Tertiary (Hordaland Group) 0.09% and Late Tertiary – Quarter (Nordland Group) 0.06%. Based on the results of the strain analysis, it can be interpreted that Late Triassic period was the rifting activity with the most significant elongation phase. Then the low strain value is interpreted as the effect of the thermal subsidence process.

Keywords: *Gjøa Field, 3D Seismic, Geological Structure Modeling, Palinspathic Analysis.*