ABSTRAK

KARAKTERISASI RESERVOIR DAN ANALISIS LINGKUNGAN PENGENDAPAN MENGGUNAKAN *FULL WAVEFORM INVERSION* DENGAN PENINGKATAN FREKUENSI, *ACOUSTIC IMPEDANCE*, DAN ATRIBUT SEISMIK
STUDI KASUS: *F3 BLOCK, DUTCH, NORTH SEA FIELD*

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Lapangan F3 *Block* terletak pada koordinat $N\ 54°\ 52'0.86"\ /\ E\ 4°\ 48'\ 47.07"$ yang merupakan wilayah laut lepas Belanda, Laut Utara. Dalam upaya pegembangan lapangan tersebut untuk pemenuhan sumber energi minyak dan gas bumi dilakukan survei seismik dan *well logging*. Berdasarkan pengolahan atribut seismik yang menggunakan *similarity* dan *chaos* didapatkan pola lingkungan pengendapan berupa *channel* yang membentuk delta dengan arah migrasi barat daya menuju tenggara. Setelah mengetahui arah migrasi, didapatkan juga karakterisasi reservoir dengan menggunakan atribut seismik, *acoustic impedance*, dan *full waveform inversion*. Zona prospek satu ditandai dengan adanya *brightspot* yang dilakukan dengan atribut *similarity*, *RMS*, dan *sweetness* didapatkan zona reservoir dangkal berupa gas *sand*. Zona prospek dua didapatkan hidrokarbon dengan karakteristik batu pasir dengan nilai impedansi akustik yang rendah 5030 $m/s * gr/cc$, porositas yang tinggi 0.3 *fraction*, densitas yang rendah 2.16 gr/cc, dan nilai amplitudo *envelope* yang tinggi. Berdasarkan *full waveform inversion* dengan peningkatan frekuensi 2,4,6,10 Hz didapatkan misfit yang rendah, akan tetapi kedalaman 0 sampai 800 m, hasil *FWI* tidak mempresentasikan keadaan geologi sebenarnya yang diakibatkan oleh *CSG* yang dibuat tidak sesuai dengan data seismik sehingga terjadi efek *multiple*/pengulangan. Berdasarkan analisis *time structure map* pada zona hidrokarbon, masih terdapat kemungkinan hidrokarbon dapat bermigrasi ke tempat yang lebih dangkal.

Kata kunci: *Channel, Acoustic Impedance, Full Waveform Inversion, CSG*.

ABSTRACT

RESERVOIR CHARACTERIZATION AND DETERMINATION ENVIRONMENT ANALYSIS USING FULL WAVEFORM INVERSION WITH INCREASED FREQUENCY, ACOUSTIC IMPEDANCE, AND SEISMIC ATTRIBUTES
CASE STUDY: F3 BLOCK, DUTCH, NORTH SEA FIELD

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*The F3 Block field is located at the coordinates N 54° 52' 0.86" / E 4° 48' 47.07" which is in the open sea area of the Netherlands, the North Sea. In an effort to develop the field to fulfill oil and gas energy sources, seismic surveys and well logging were carried out. Based on the processing of seismic attributes using similarity and chaos, the depositional environment pattern is in the form of a channel that forms a delta with a southwest to southeast migration direction. After knowing the direction of migration, reservoir characterization is also obtained using seismic attributes, acoustic impedance, and full waveform inversion. Prospect zone one is characterized by the presence of a brightspot which is carried out with the attributes of similarity, RMS, and sweetness, which results in a shallow reservoir zone in the form of gas sand. Prospect zone two obtained hydrocarbons with sandstone characteristics with a low acoustic impedance value of 5030 m/s*gr/cc, a high porosity of 0.3 fraction, a low density of 2.16 gr/cc, and a high amplitude envelope value. Based on full waveform inversion with an increase in frequency of 2,4,6,10 Hz, low misfit is obtained, but depths of 0 to 800 m, FWI results do not represent the actual geological conditions caused by CSG which is made not in accordance with seismic data so that multiple effects occur repetition. Based on the analysis of the time structure map in the hydrocarbon zone, there is still a possibility that hydrocarbons can migrate to shallower place.*

Keyword: *Channel, Acoustic Impedance, Full Waveform Inversion, CSG*.