INTISARI

Estimasi Sebaran Fluida dan Litologi pada Reservoar Batupasir menggunakan Inversi Simultan di Lapangan Teapot Dome, Cekungan Powder River, Natrona Country, Wyoming, Amerika Serikat

Krisna Hanjar Prastawa
12/33401/PA/14934

Teapot Dome merupakan salah satu lapangan penghasil hidrokarbon yang terletak di cekungan Powder River. Formasi Frontier khususnya batupasir Second Wall Creek menjadi reservoar terbesar penghasil hidrokarbon di lapangan Teapot Dome. Untuk mengetahui sebaran zona prospek hidrokarbon dilakukan inversi simultan. Inversi simultan menggunakan data *partial stack* dari variasi sudut (*near, middle* dan *far angle stack*) yang kemudian diinversikan bersamaan menggunakan *wavelet* hasil estimasi setiap *stack*. Hasil dari inversi simultan berupa impedansi akustik, impedansi *shear* dan densitas. Tiga properti fisika tersebut ditransformasikan menjadi *lambda mu rho*, impedansi Poisson dan rasio Vp/Vs. Properti fisika batuan yang sensitif terhadap perubahan litologi dan efek fluida digunakan untuk mengetahui sebaran zona prospek hidrokarbon.

Hasil penelitian menunjukkan bahwa *mu rho* dan impedansi Poisson litologi merupakan properti fisika yang sensitif terhadap perubahan litologi, sedangkan *lambda rho* dan Vp/Vs sensitif terhadap keberadaan fluida hidrokarbon. Litologi *clean sandstone* dapat dibedakan oleh impedansi Poisson litologi dengan rentang nilai (-17000)- (-10000) (ft/s).(gr/cc), dan *mu rho* dengan nilai yang relatif tinggi, >31 GPa.gr/cc. Keberadaan fluida hidrokarbon dapat diketahui dari rasio Vp/Vs dengan rentang nilai 1,50-1,62, dan *lambda rho* dengan rentang nilai 13-22 GPa.gr/cc. Batupasir Second Wall Creek tersebar hampir di seluruh area lapangan Teapot Dome, terdapat litologi *shale* di sebelah selatan sumur 11-AX-11. Zona prospek hidrokarbon pada batupasir Second Frontier Wall Creek sebagian besar terletak di puncakan stuktur *dome* sisi bagian selatan. Di sisi bagian utara lapangan Teapot Dome juga terdapat zona prospek hidrokarbon tetapi dengan area yang lebih sempit dan cenderung tersebar.

Kata kunci: inversi simultan, *lambda mu rho*, impedansi Poisson, rasio *Vp/Vs*

ABSTRACT

Estimation of Fluid and Lithology Distributions on Sandstone Reservoir using Simultaneous Inversion in Teapot Dome Field, Powder River Basin, Natrona Country, Wyoming, United States of America

Krisna Hanjar Prastawa
12/33401/PA/14934

Teapot Dome is one of hydrocarbon-producing field, which is located in Powder River Basin. Frontier formation especially Second Wall Creek sandstone became the biggest hydrocarbon-producing reservoir in Teapot Dome field. To determine hydrokarbon-bearing zone in this area conducted simultaneous inversion. Simultaneous inversion uses partial stack data with variations of angle (near, middle, and far angle stack). The partial stack data will be inverted simultaneously using wavelets which were estimated from every stack. The resutls from simultaneous inversion are acoustic impedance, shear impedance and density. Three physical properties are transformed into lambda mu rho, Poisson impedance and Vp/Vs ratio. Rock physics properties which are sensitive to lithology differences and fluid effect are used to determine the distribution hydrocarbon-bearing zone.

The result shows that rock physics properties mu rho and Poisson impedance- lithology are sensitive to lithology differences, while lambda rho and Vp/Vs ratio are sensitive to hydrocarbon identification. Clean sandstone can be discriminated by Poisson impedance-lithology with value ranging from (-17000) – (-10000) (ft/s).(gr/cc), and mu rho with a relatively high value >31 GPa.gr/cc. The presence of hydrocarbon can be determined by Vp/Vs ratio with value ranging from 1,50-1,62, and lambda rho with value ranging from 13-22 GPa.gr/cc. Second Wall Creek sandstone spread almost all over Teapot Dome field area, there shale in the southern well 11-AX-11. Hydrocarbon-bearing zone in Second Frontier Wall Creek sandstone is largely located on peak of dome structure in the southern part. In the northern part of the Teapot Dome field also contained hydrocarbon-bearing zone but with small areas and tend to spread.

Keyword: simultaneous inversion, lambda mu rho, Poisson impedance, Vp/Vs ratio