Exploring Lame' rock parameter extractions using AVO analysis for detection of good carbonate reservoir locations

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ABSTRACT
Hydrocarbon exploitation within the Williston Basin in southeastern Saskatchewan is situated along the subcrop edges of Mississippian Madison Group-aged carbonate to evaporitic lithosequences. Reservoir sequences are comprised of oiid to peloidal lime grain to packstone lithologies of shoaling complexes situated along structural ridges that possess updip plugging of reservoir away from the oil-water interface. Prime reservoir development is found in shoals developed over paleotopographic highs and at least five to eight meters away from the Mississippian erosional surface such that the destructive diagenetic changes that produce anhydritization and dolomitization of potential reservoir are protected from these invading fluids.

The geophysical interpretation of 3D seismic data resulted in the delineation of areas exhibiting critical amplitude and wavelet character anomalies that lead to the drilling of successful wells in finding excellent carbonate reservoirs protected from anhydritization below the Mississippian erosional unconformity. Amplitude-variation-with-offset analysis was run to discriminate lithology, porosity and pore-fluid saturates. The products of the Lame' rock parameters, incompressibility (λ) and rigidity (μ) with density (ρ) were extracted from seismic inversions for P-and S-impedances. The extraction of $\lambda\rho$ and $\mu\rho$ and computation of λ/μ ratio indicated potential good reservoir pockets leading to the drilling of good productive wells.