Tectonic Control on Hydrocarbon Plays in the Western Canadian Basin

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Recent interpretation of high resolution aeromagnetic surveys, RADARSAT images and other available geological and geophysical data has led to the construction of a new tectonic element map for large portions of the Western Canada Basin and contiguous Rocky Mountain Fold and Thrust Belt. We examine in this talk the structural style of several known and newly identified tectonic elements, illustrate their plate tectonic association and deformation history, and demonstrate their possible influence on the development of several key clastic and carbonate plays in this basin.

Some of the key examples which are illustrated in this talk include: 1) Evidence of reactivated structures and basement topographic features along segments of the Hay River Shear Zone and their possible control on hydrocarbon plays, 2) the development of unique structural features and related hydrocarbon plays along segments of the Bovie Lake Fault Zone, 3) the unique structural inversion of the Monias field and its related hydrocarbon plays, 4) fault controlled hydrothermal dolomite trends in NE BC and the Peace River Arch, 5) the control of uplifted basement blocks on the development of incised valley systems in the Peace River Arch and Central Alberta, and 6) the presence of 'tear faults' and 'cross-strike discontinuities' that control the position of the major hydrocarbon discoveries in the fold and thrust belt region.

In the closing remarks, we use surface and subsurface analogs and laboratory models to illustrate the most common spatial relationships between structures and reservoir rocks in the Western Canada Basin and illustrate several different techniques that may be used to identify new potential hydrocarbon plays in the less explored portions of this basin.

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