# Fill-and-spill model for trap charge, central Alberta foothills

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The last five years have seen a renaissance of drilling in the central Alberta foothills between T41 and T48. High gas prices and advancements in directional/horizontal drilling technology have caused this resurgence in an area where many of the pools had been defined by the mid-1970's. We have compiled structural data on trap closures and compared that with pressure data from DSTs and build-ups after production tests. These data bear on the location of spill points and the degree of compartmentalization within Mississippian Turner Valley pools in the area.

Our data suggest that gas-water contacts (gwcs) are deepest in Stolberg in T41 in the SE and are progressively shallower to the NW, as far as Mountain Park in T47. Where we can map spill points, it appears that pools are filled to spill and that gwcs coincide with the Top Turner Valley structural saddle at the NW ends of pools. This observation, coupled with similarities in gas compositions, suggests that at least some gas in this system has migrated over 100km from SE to NW along the structural crest of the trend, ultimately leaving the system in T47 or T48 at a leak point that we have not mapped.

With respect to compartmentalization of Turner Valley reservoirs in this trend, pressure similarities within individual pools and our regional fill-and-spill model leads us to propose the following. Thick, carbonate reservoirs that are overlain by thick, high-quality topseals like the Fernie Shale are not prone to becoming compartmentalized by small faults, at least on the geologic time scale of gas migration and initial trap charge. These systems are dominated by lateral hydrocarbon migration and in fact the faults are likely to be conduits rather than barriers to flow. Systems that are prone to compartmentalize are more likely to have multiple, thin, reservoir intervals, relatively thin top seals, and crestal faults. Such systems are dominated by vertical migration, and small-scale faults are capable of isolating multiple hydrocarbon columns within the area of a single structural closure. The tremendous variability in performance between individual Turner Valley wells in the central Alberta foothills does not signify compartmentalization, but instead demonstrates how dramatically the permeability varies laterally in these fractured reservoirs.