

Liard Basin: Tectonic Evolution and Petroleum Potential

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The dominant structural feature of the Liard Plateau-Trout Plain region is the north-trending Bovie Structure. This feature separates a thicker Paleozoic-Mesozoic succession in the Liard Basin to the west from a thinner succession in the Interior Plain. Some Paleozoic units, such as the gas-bearing deltaic sands of the Mattson, are almost entirely contained within Liard Basin. The northern mapped limit of the Bovie Fault and Bovie-related structures is about 60°40'. However, aeromagnetic and seismic data indicate that the deeper Bovie Fault continues northward in the subsurface to about 61° north latitude and southward to about 59° north latitude.

Rapid subsidence west of Bovie Structure formed a westward-thickening sedimentary prism in early Paleozoic time. By late Paleozoic (post-Keg River) time Liard basin had developed a steep northwest flank extending from the Northwest Territories into British Columbia. This coincides with an exploration fairway of enhanced Manetoe dolomitization in the Nahanni and Dunedin formations. Later erosional truncation of the Mattson sands beneath Permian Cretaceous strata also formed potential stratigraphic plays. This was followed by development of a westward-verging, high angle reverse fault, the Bovie Fault, which extends upwards from the Proterozoic through to the Mississippian causing development of a narrow west-dipping monocline in overlying Mesozoic strata. Laramide compression in Early Tertiary time generated a thin-skinned, eastward-verging thrust within the Banff Formation that was deflected upward at this subsurface monocline. Gas fields, such as the Maxhamish gas field, and numerous gas shows are associated with Bovie-related structures.