

## ABSTRACT

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Geology

Crustal Structure of Northwestern Montana (63 pp.)

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Northwestern Montana is a structurally complex and diverse region of the northern Rocky Mountains. The regional Bouguer gravity map of the area demonstrates significant differences in the crustal structure between northwestern Montana and surrounding areas.

Gravity modeling of the long-wavelength Bouguer anomaly, which is believed to be related to the configuration of the crust-mantle boundary, agrees well with previous seismic refraction surveys indicating a crustal root under the approximate position of the Rocky Mountain Trench. The Purcell anticlinorium and related geophysical anomalies north of the Lewis and Clark line and south of the Moyie fault appear to be the result of high-density low-susceptibility Purcell sills emplaced into the Lower Prichard approximately 870 m.y.b.p. Subsequent to their emplacement the sills were deformed concentrically with the encasing Belt strata by compressional forces related to the formation of the fold and thrust belt. Later modification by extensional tectonics and erosion led to the present day configuration of the Purcell anticlinorium and related features such as the Sylvanite anticline. A combination Purcell sill-basement ramp anticline model is also possible and, therefore, does not preclude the possibility of crystalline basement involvement in thrusting at depth.

It appears unlikely that Phanerozoic rocks extend west of the Whitefish listric normal fault in the subsurface, therefore exploration for Paleozoic hydrocarbon reservoirs should be limited to the area immediately west of Glacier National Park. Additionally, the probability of Paleozoic strata in the subsurface below the Hefty thrust decreases to the west toward the Rocky Mountain Trench. Two Tertiary basins of northwestern Montana, the Rocky Mountain Trench and the Kishenehn Basin, may be hydrocarbon productive if stratigraphic and structural development prove favorable.