

Stratigraphy, Structure and Petroleum Potential of the Holitna Lowland Area, Southwest Alaska

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A lithologically diverse succession of Neoproterozoic through Cretaceous age sedimentary rocks are exposed around the margin of the Holitna Lowlands in southwest Alaska. Neoproterozoic through late Paleozoic basinal and platform carbonate rocks, Triassic non-marine (?) and marine siliciclastic rocks and extrusive basaltic volcanic rocks, and Cretaceous deep- and shallow-marine siliciclastic rocks have been structurally shortened and exposed between two regional, Tertiary-age right-lateral strike-slip faults. Five second-order sequences are recognized in Neoproterozoic through Triassic rocks. The oldest three sequences (Neoproterozoic; Early Cambrian to late Early Ordovician; and Middle Ordovician to Early Devonian) record deposition on an arcuate rifted continental margin bordered by a marine basin toward the north and northwest. Complex facies relationships in the youngest two sequences (late Early Devonian to Mississippian and Pennsylvanian to Triassic) suggest deposition in an unstable tectonic setting.

These rocks are deformed by south- and southeast-verging fold and thrust structures of post-Triassic and pre-Albian age. Deformation of an Albian and younger clastic overlap assemblage suggests additional deformation, probably related to strike slip, during late Cretaceous and Tertiary time. While most rocks in the area are overmature, thermally mature rocks (CAIs from 1.5 to 2.5) occur in the footwall of a major thrust in the northeastern part of the Holitna area. This, in addition to the occurrence of solid bitumen in Ordovician and Devonian rocks suggests the Holitna basin has unexplored petroleum potential.