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Geology and Petroleum Potential of Shumagin Continental Margin, Western Gulf of Alaska

Interpretations of multichannel seismic reflection data indicate that the Shumagin continental margin seaward of the Border Ranges fault is underlain by two major seismic sequences, separated by an erosional unconformity beneath the shelf and by the time-correlative conformity seaward. Rocks above the unconformity are late Miocene and younger. Rocks below the unconformity can be as young as middle Miocene beneath the outer shelf and slope, seaward of a paleoshelf break. However, beneath the shelf they are primarily Late Cretaceous turbidites of the Shumagin Formation and Paleocene granodiorite.

Late Miocene and younger structures of the Shumagin margin include Shumagin, Sanak, and Unimak basins and Unimak Ridge, a midslope structural high. Strata in Sanak and Unimak basins were deposited on a subsiding outer shelf and slope, and trapped behind Unimak Ridge and its now-buried structural continuation. Sanak and Unimak basins are in part bounded by northwest-trending extensional faults that parallel both the early Tertiary Beringian margin and a transverse tectonic boundary that segments the forearc. These faults may have developed during collapse and extension along the southeastward continuation of the old Beringian margin, analogous to the processes that created the Bering Shelf basins.

The most promising areas of the Shumagin margin for petroleum potential are Sanak and Unimak basins, which contain strata 8 and 4.5 km thick, respectively, and beneath the outer shelf and slope. Paleogene source rocks like those on the adjacent Alaska Peninsula may be preserved offshore, seaward of the inferred paleoshelf break. Reservoir rocks might have formed from granitic-rich erosional products derived during Oligocene and Miocene erosion of the shelf plutons.