major decollements are recognized. In the mountain belt, the lower one lies in the Lower Carboniferous Kayak Formation but often steps down to the base of the Upper Devonian Kanayut or Lower Carboniferous Kekiktuk Conglomerates. Near the Sadlerochit and Shublik Mountains, it steps down to its deepest level to the base of the Cambrian to Middle Devonian Katakturuk Dolomite. The upper decollement is poorly exposed in the mountains and lies in the Jurassic Kingak Shale. Locally, these are removed by Early Cretaceous erosion and the decollement steps upsequence.

The two decollements separate three tectonic sequences that deform differently. First, basement below the lower decollement deforms into a set of thrust duplexes. The core of these is well exposed in the Franklin Mountains. The Sagavanirktok sidewall ramp is a major basement structure that causes the northern swing in the mountain front between the central and northeastern Brooks Range. Second, the lower cover between the two decollements deforms more complexly than basement by both passive drape over the underlying duplexes and by active thrust stacking. Large-scale buckle folding occurs in a shear zone above the Sagavanirktok sidewall ramp. Third, the upper cover above the upper decollement is poorly preserved in the mountains as allochthonous klippe in depressions in the basement and lower cover duplexes.

Crustal shortening across the eastern Brooks Range is estimated by two-dimensional section balancing at over 400 km. This is substantially more than previous estimates and is comparable to those for the western Brooks Range. The inferred lack of relative rotation between the western and eastern Brooks Range does not substantiate a rotational opening for the Arctic Ocean.

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Description and Mineralogy of Tertiary Volcanic Ash Partings and Their Relationship to Coal Seams, Near Homer, Alaska

Outcrops of Tertiary coal-bearing units in sea cliffs of the Kenai Peninsula provide an excellent study area for volcanic ash partings in coals. Twenty mid- to late-Miocene, 50-cm to 3-m thick coal seams exposed in the sea cliffs about 10 km west of Homer contain an average of 10 volcanic ash or lapilli tuff partings each. The bedding relationships of the coal with any one parting cannot be predicted, and the contacts of the partings with the coal range from very sharp to predominantly gradational. These bedding relationships provide clues about the surface on which the ashes fell and on which the coal was accumulating. For example, some ashes fell in standing water, others on irregular subaerial surfaces.

The partings are in various stages of alteration to kaolinite and bentonite, and vary in thickness from a few millimeters to about 10 cm. The consistency and texture of the partings depend on the degree of alteration; the less altered partings display visible pumice fragments and euhedral feldspars, commonly within a finer grained matrix. Separate pumice fragments, excluding matrix, can also occur as partings in the coal. The more altered partings may be wet and plastic, or they may be well indurated claystones; the colors range from gray-yellow to dark brown. The indurated partings are more common in the older part of the section. The coal seams may be capped by volcanic ash partings and are commonly underlain by a pencil shale of nonvolcanic origin.

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Lower Paleozoic Carbonate Slope-Sequence, Northern Seward Peninsula, Alaska

Examination of a lower Paleozoic carbonate unit exposed along the northern coast of the Seward Peninsula revealed an undeformed section at Cape Deceit, greater than 160 m (525 ft) thick, that represents part of a prograding carbonate submarine-fan sequence. The top 60 m (200 ft) of the sequence is a massive, disorganized, carbonate conglomerate interpreted to be debris flows deposited in large feeder channels of an inner-fan complex. Stratigraphically below this interval are channelized conglomerates and calcarenites, 40-50 m (131-165 ft) thick. Overall, this section thickens and coarsens upward but is composed of many thinning- and fining-upward cycles, 2-8 m (7-26 ft) thick. This section probably represents channel deposits of the midfan complex. The bottom part of the sequence consists of a coarsely crystalline, thinly bedded limestone section overlying a calcareous shale section. The beds within this section are laterally extensive and represent outer-fan, fan-fringe, and basin-plain deposits.

Although no recognizable megafossils were found in the Cape Deceit section, Silurian conodonts have been reported by other workers. Rugose coral fragments of indeterminate age were found in an undeformed section, 19 km (10 mi) to the east, which appears to be correlative with the Cape Deceit section.

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Coal in National Petroleum Reserve in Alaska (NPRA): Framework Geology and Resources

The North Slope of Alaska contains huge resources of coal, much of which lies within NPRA. The main coal-bearing units, the Corwin and Chandler Formations of the Nanushuk Group (Lower and Upper Cretaceous), underlie about 20,000 mi^2 (51,800 km^2) of NPRA. They contain low-sulfur, low-ash, and probable coking-quality coal in gently dipping beds as thick as 20 ft (6.1 m) within stratigraphic intervals as thick as 4,500 ft (1,370 m). Lesser coal potential occurs in other Upper Cretaceous units and in Lower Mississippian and Tertiary strata.

The river-dominated Corwin and Umiat deltas controlled the distribution of Nanushuk Group coal-forming environments. Most organic deposits formed on delta plains; fewer formed in alluvial plain or delta-front environments. Most NPRA coal beds are expected to be lenticular and irregular, as they probably accumulated in interdistributary basins, infilled bays, or inland flood basins, whereas some blanket beds may have formed on broad, slowly sinking, delta lobes. The major controls of coal rank and degree of deformation were depth of burial and subsequent tectonism.

Nanushuk Group coal resources in NPRA are estimated to be as much as 2.75 trillion short tons. This value is the sum of 1.42 trillion short tons of near-surface (< 500 ft or 150 m of overburden) bituminous coal, 1.25 trillion short tons of near-surface subbituminous coal, and 0.08 trillion short tons of more deeply buried subbituminous coal. These estimates indicate that the North Slope may contain as much as one-third of the United States coal potential.

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Terrane-Capture Concept for the Origin of the Aleutian-Bering Sea Region—Implications for Petroleum Resources in the Deep-Water Aleutian Basin

Regional geological and geophysical relations support the notion that the basement of the Aleutian basin of the Bering Sea is a far-traveled terrane of oceanic crust. This terrane—named Aleutia—is probably a fragment of Pacific lithosphere (Kula plate?) that formed at an equatorial spreading center in the Early Cretaceous. Aleutia arrived in the Aleutian-Bering Sea region about 55 Ma and was accreted to the Alaskan-Siberian continental margin when a long-established subduction zone located there was abandoned and shifted southward to the present offshore position of the Aleutian Arc. Formation of the arc entrapped Aleutia in the Bering Sea and thereby formed the Aleutian basin, which has since accumulated a geosynclinally massive overlap assemblage of rise-prism and basin-plain deposits as thick as 12 km.

The capture concept of Aleutia introduces two speculative circumstances relevant to assessing the resource potential of the Aleutian basin. First, the likelihood that in the middle Cretaceous its relatively shallow submerged basement resided near an equatorial spreading center implies that younger basin-plain deposits of the overlap assemblage may have accumulated above oceanic pelagic beds rich in organic matter. Elsewhere in the Pacific, middle Cretaceous beds deposited on bathymetric highs are known to be uncommonly rich in organic matter (C_o = 1-9%). Second, if deposits of the global anoxic event accumulated on Aleutia, it is likely that large amounts of organic matter were conveyed to the now-abandoned Mesozoic subduction zone at the base of the Alaskan-Siberian margin. Pelagic source beds for hydrocarbons may therefore be stored within fossil subduction complexes buried beneath the present continental rise prism.