merian and basement strata occur in widespread sheets. These sands can be important reservoirs, such as the Kuparuk and Point Thomson formations, of late Hauterivian–Barremian age (?ca. 11 STBOIP total).

Finally, within the Brookian megasequence, large volumes (?ca. 20 billion STBOIP) of relatively heavy oils are trapped in the Late Cretaceous to early Tertiary West Sak and Ugnu formations. These sands are of marine-shelf to fluvial/deltaic depositional environments, topset strata of a Laramide prograding clastic wedge.

EGGERT, J. THOMAS, ARCO Alaska, Inc., Anchorage, AK

Petrology, Diagenesis, and Reservoir Quality of Lower Cretaceous Kuparuk River Formation Sandstone, Kuparuk River Field, North Slope, Alaska

The Kuparuk River formation consists of upper and lower members separated by an intraformational unconformity. Marine sandstone in each is distinct in terms of depositional environments, sand-body geometry, texture, composition, diagenesis, and reservoir quality.

Sandstone in the upper member is very fine to very coarse-grained sublitharenite to lithic arenite with an average quartz-feldspar-lithic (QFL) of 75-1-24. Glauconite constitutes 10-50% of framework grains. Chert, muscovite, heavy minerals and mudstone, limestone, siderite, and metasedimentary rock fragments are less abundant. The diagenetic sequence is: aragonite or high-Mg calcite-collophane-pyrite-siderite-ankerite-calcite-(dissolution of carbonate cements and glauconite)-quartz-kaolinite-illite/smectite-pyrite.

Sandstone in the lower member is very fine to fine-grained quartz arenite to subarkose with an average Q-F-L of 92-5-3. Mudstone fragments, chert, muscovite, heavy minerals, and glauconite are less abundant. The diagenetic sequence is: pyrite-siderite-ankerite-calcite-(dissolution of ankerite and feldspar)-quartz-kaolinite-illite/smectite-pyrite.

Early diagenesis in upper and lower member sandstones is different, whereas burial diagenesis is similar. Early siderite cemented sandstones in the upper member but did not significantly affect sandstones in the lower member. Subsequent changes in pore fluid chemistry during burial resulted in precipitation of the cement sequence siderite-ankerite-calcite in both upper and lower member sandstones. Stable isotope trends in carbonate cements parallel those of cement texture and composition.

Upper member porosity (mostly secondary) and permeability average 23% and 130 md, with upper limits of 28-33% and 500-1,500 md, respectively. Reservoir quality is heterogeneous and controlled by grain size, distribution of primary and secondary porosity, and fractures. Both horizontal and vertical permeability are similar except where fractures enhance horizontal permeability.

Lower member porosity (mostly primary) and permeability average 23% and 100 md, with upper limits of 28-30% and 400-500 md, respectively. Reservoir quality is homogeneous. Ankerite locally eliminates porosity, and shale beds and laminations reduce vertical permeability.

EHM, ARLEN, Geol. Consultant, Anchorage, AK, and I. L. TAILLEUR, U.S. Geol. Survey, Menlo Park, CA

Refined Names for Brookian Elements in Northern Alaska

The major negative element of the North Slope has been called the Colville geosyncline, the Colville trough, the Colville foredeep, or the Colville basin, whereas the positive element coupled to the north has been universally called the Barrow arch. The name "Colville basin" is most consistent with the apparently compound nature of this foreland successor element. We also recommend that "Barrow inflection" be substituted for "Barrow arch" as the name for the positive element or structural hinge that formed between middle Cretaceous deposits in the basin and those along the continental margin. The term "inflection" aptly describes the weak reversals in regional dip that mark this feature, and constrains the sense of either active uplift or a preexisting high, which has evolved with current usage of "arch".

The markedly asymmetric Colville basin consists of: deformed and thickened middle Cretaceous flyschoid deposits lying on earlier Cretaceous allochthons of the ancestral Brooks Range; a greater than 10-km thick belt of deposits that is incoherent on seismic records but is floored by poor reflectors, presumably of earliest Cretaceous and older age; and a foreland flank that slopes gently from within a kilometer of the surface at Point Barrow, about 200 km to the north. Seismic profiles show this flank to have been an abyssallike plain after Barrovia, the northern provenance of Ellesmerian deposition, had been replaced by the Arctic Ocean early in Cretaceous time. The flank was more than 1 km deep and stretched broadly southward from the new continental edge that now seems to be nearly 30 km north-northeast of Barrow. The plain was progressively loaded and depressed, first by the downlapped distal edge of the flysch prism in the south and then by the shelf of molassoid deposits that prograded from the Brookian orogen during the middle Cretaceous.

The Barrow inflection denotes reversals in regional dips from less than 2° to the south to approximately 1° to the north. The axes of reversals subparallel the present coastline between Barrow and the Arctic National Wildlife Refuge and plunge eastward at a rate of approximately 1 km/100 km. Inflections on successive stratigraphic horizons do not stack vertically as in parallel folds; dip reversals in the lowest Brookian strata, for example, occur several kilometers south of the inflection on the basement surface. The structure appears to have formed as the prograding middle Cretaceous deposits (Nanushuk Group) made the foundation for the present continental terrace; subsidence of the continental margin beneath that load reversed dips along the former north edge of the Colville basin. Minor and relatively passive upward bowing likely occurred along this hinge between the negative (depressed) elements. The Barrow positive feature clearly is an arch neither in the sense of a broad anticlinal fold nor in the sense of a high such as the Cincinnati arch. It had no north flank before the Late Cretaceous, and it could not have been an element of pre-Brookian (Ellesmerian) geology.

ESTABROOK, C. H., Univ. Alaska, Fairbanks, AK, J. N. DAVIES, Univ. Alaska, and Alaska Div. Geol. and Geoph. Surveys, Fairbanks, AK, and D. B. STONE, Univ. Alaska, Fairbanks, AK

Seismotectonics and Structure of Brooks Range, Alaska

Data collected by seismic networks operated by the Geophysical Institute of the University of Alaska–Fairbanks are used to study the seismicity and tectonics of northern Alaska. Microearthquake activity (less than 4.7 M_L) is seen as a diffuse band trending north-northeast from Fairbanks to Barter Island and as an easterly trend roughly parallel to, but south of, the crest of the Brooks Range. Depths of the events range from 10 to 25 km. Some clustering occurs, with the most clearly defined feature being a line of epicenters at 157° 30′ that trends north between 66° and 67°N.

A crustal velocity structure of the eastern Brooks Range is constrained using refracted phases from earthquakes local to the Barter Island, Fort Yukon, and Fairbank networks, respectively. Focal mechanism solutions from the Brooks Range show normal, thrust, and strike-slip faulting. Common to all of them, however, is an east-striking nodal plane that parallels the regional structural grain, suggesting that the fault planes are on reactivated faults. This is in contrast to the earthquakes in interior Alaska, which show mainly strike-slip focal mechanisms. The orientation of the pressure axes in both areas is consistent with the convergence of the Pacific and North American plates.

FOLEY, JEFFREY Y., and JAMES C. BARKER, U.S. Bureau of Mines, Fairbanks, AK, and LAWRENCE L. BROWN, U.S. Bureau of Mines, Albany, OR

Critical and Strategic Minerals Investigations in Alaska: Chromium

The Bureau of Mines investigated chromite deposits and occurrences in Alaska between 1979 and 1984 as part of the Bureau's critical and strategic minerals program. Beneficiation and mineralogical characterization tests were performed on 68 samples.

Chromite-bearing ultramafic rocks occur in eight regions in Alaska. One hundred sixty-one subeconomic podiform-type deposits and one placer deposit are estimated to contain 3.4-4.7 million tons of chromic oxide (Cr_2O_3) in high-chromium and high-iron chromite. In most cases, mine-site beneficiation would be required to produce shipping-grade concentrates.

In the Chugach trend, an inferred reserve base comprises 2.8 million tons of Cr_2O_3 in 42 deposits that are all within 10 mi of tidewater or existing transportation routes. Most of these are indicated reserves (1.8 million tons) contained in the newly discovered Turner stringer zone and