The transcurrent movements which transported these sequences into Alaska and contiguous Yukon probably began in the Cretaceous as a result of southwesterly Arctic plate motion. Simultaneously, however, northwesterly translation of cordilleran elements interfered with this movement, causing complex dovetailing of geologic blocks and the evolution of a curious, but systematic pattern of orogenic uplifts. Thermal activity associated with these uplifts has locally reduced the originally high petroleum potential of the region.

MAGOON, LESLIE B., U.S. Geol. Survey, Menlo Park, CA, and GEORGE E. CLAYPOOL, U.S. Geol. Survey, Denver, CO

Two Oil Types on North Slope of Alaska—Implications for Future Exploration

The North Slope of Alaska is a proved petroleum province containing numerous seeps, many small undeveloped oil fields, and the largest oil field on the North American continent, Prudhoe Bay. Genetic relations among oils in the NPRA (National Petroleum Reserve in Alaska), the Prudhoe Bay area, and the Arctic Wildlife Range have important implications for future exploration.

Forty-two oil samples from across the North Slope analyzed by the U.S. Bureau of Mines and the U.S. Geological Survey suggest two separate oil types, even though some oils are biodegraded. The first, the Barrow-Prudhoe oil type, is present in reservoir rocks of Carboniferous to Tertiary age and includes oils from South Barrow gas field, Prudhoe Bay oil field, and the Fish Creek 1 test well. Physical properties of Barrow-Prudhoe oils are variable, but in general the oils are medium-gravity, high-sulfur, with a slight even-numbered n-alkane predominance and pristane-to-phytane ratio of less than 1.5. The second type, the Simpson-Umiat oil type, is present in reservoir rocks of Cretaceous to Quaternary age and includes oils from seeps in the Skull Cliff, Cape Simpson, Manning Point, and Ungoon Point areas, the Wolf Creek 3 test well, and the Umiat oil field. These are higher gravity, low-sulfur oils with no or slight odd-numbered n-alkane predominance and pristane-to-phytane ratios greater than 1.5.

NORTH SLOPE OIL TYPES

	Barrow-Prudhoe	Simpson-Umiat
API gravity	25	35
Sulfur, percent	0.9	0.1
CPI	<1	≥1
Pristane/phytane	<1.5	>1.5
$\delta^{34}S$, permil	<-4	>-3
$\delta^{13}C_{sat}$, permil	-30	-29
$\delta^{13}C_{arom}$, permil	-29.5	-28
$\delta^{13}C_{whole\ oil}$, permil	-30	-28.5

The two types probably originate from different sources, the Barrow-Prudhoe type from a carbonate or other iron-deficient source rock, and the Simpson-Umiat type from a siliciclastic source rock. Distribution of the two oil types indicates at least two exploration fairways. The fairway for the Barrow-Prudhoe type is along the Barrow arch, and the fairway for the Simpson-Umiat type coincides with the area of best reservoir development of the Nanushuk Group.

MAHAN, THOMAS K., and WILLIAM B. HARRISON, III, Western Michigan Univ., Kalamazoo, MI

Depositional Environment of Lower Cincinnatian Kope Formation and Some Paleoecologic Implications

The lower Cincinnatian Kope Formation in southwestern Ohio and northern Kentucky has been previously studied from the standpoint of paleontology, lithology, and stratigraphy. This study, however, deals with the environment within which the Kope Formation was deposited with some paleoecologic implications.

The Kope Formation is defined as comprising at least 75 to 85% shale and siltstones with thin (5 to 10 cm), laterally discontinuous lenses of predominantly biogenic limestone and biomicrite. Shales are usually fissile while the coarser grained siltstones are more blocky and occasionally rippled or cross-stratified.

The bioclasts in the limestones were measured as discrete grains in an attempt to analyze flow regimes. Degree of sorting and grain roundness varied somewhat but consistently indicated that transport distance and length of time were kept to a minimum. Several of the limestone lenses are megaripple-bedded indicating a higher flow regime.

Faunal diversity is low, generally limited to three or four numerically abundant species. The morphology of the organisms suggests that they were adapted to a soft substrate and probably served as pioneer communities. Burrowing traces were present in the limestones although not as abundantly as in the shale and siltstones.

The environment of the Kope Formation was one of shallow, quiet water in a marine setting where sedimentation was slow and consisted of silt and clay. This setting was periodically interrupted by storm events and changing current patterns which disrupted the isolated communities of organisms and spread their remains laterally, producing carbonate shoals and migrating bioclastic ripples. These events probably represent occasional "instants" of geologic time while the more typical deposition was clay and silt in calmer water.

MALEK-ASLANI, M., Tenneco Oil Co., Houston, TX

Environmental and Diagenetic Controls of Carbonate Source Rocks

The preservation and evolution of organic matter in carbonate rocks are controlled by the depositional environments, eogenesis, mesogenesis, and telogenesis. Tidal flat, restricted lagoon, and basinal environments