

### GEOLOGIC MAPS OF NORTHERN ALASKA

Edited by  
David W. Houseknecht

Arctic Alaska hosts a spectrum of geologic and a wealth of natural resources... The U.S. Geological Survey (USGS) performed the initial systematic mapping of the geology of Alaska's North Slope... This geologic map is a compilation of previously published USGS geologic mapping by Detterman and others (1963), Chapman and others (1964), and Broge and Whittington (1966), combined with data from unpublished geologic mapping by Pessel and Mull (1994) or Richfield Oil Corporation and Martin (1968) for British Petroleum Company.

### GEOLOGIC MAP OF THE IKIPIPUK RIVER QUADRANGLE

By  
Charles G. Mull, David W. Houseknecht, G.H. Pessel, and  
Christopher P. Garrity

#### INTRODUCTION

The Ikiipuk River quadrangle (1:250,000) is located in the east-central Arctic North Slope of Alaska. This geologic map is a compilation of previously published USGS geologic mapping by Detterman and others (1963), Chapman and others (1964), and Broge and Whittington (1966), combined with data from unpublished geologic mapping by Pessel and Mull (1994) or Richfield Oil Corporation and Martin (1968) for British Petroleum Company.

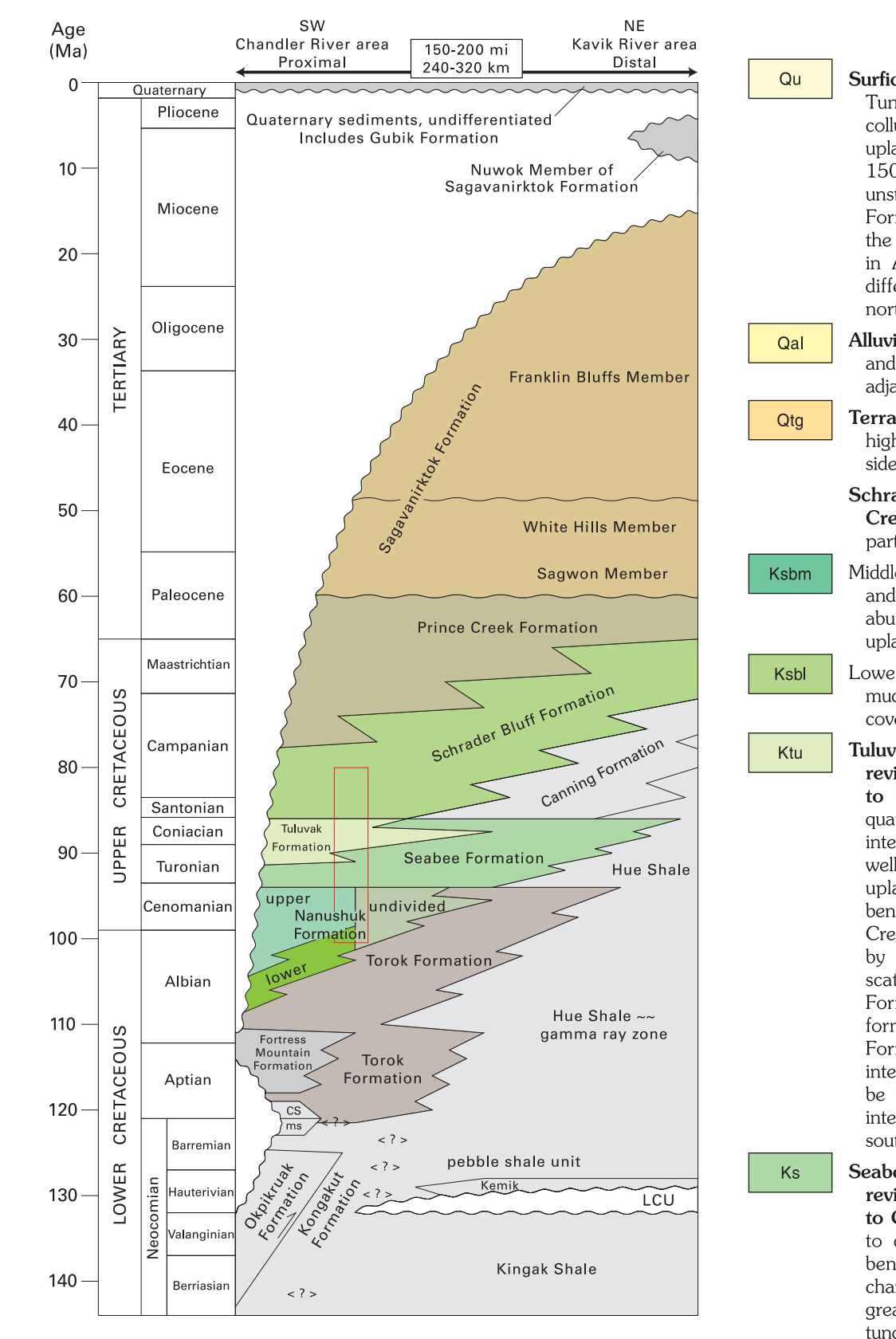
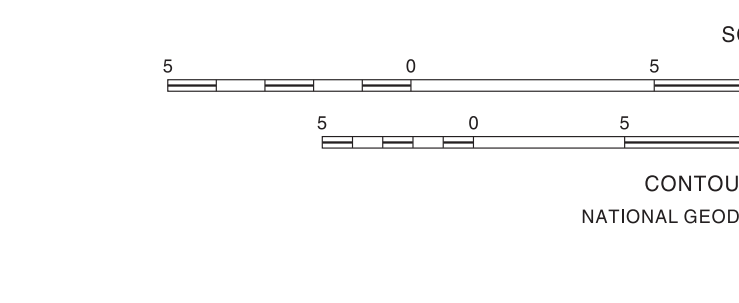
#### HISTORY OF EXPLORATION

The Ikiipuk River quadrangle and the adjacent Umiat quadrangle played an important role in the early stages of oil exploration in Naval Petroleum Reserve #4 (NPR-4), now known as the National Petroleum Reserve in Alaska, or NPR(A). The area was first traversed by a USGS field party in 1924 (Smith and others, 1926; Smith and Merriam, 1930), not long after the establishment of NPR-4 in 1923.

#### REGIONAL SETTING

The geology of the Ikiipuk River 1:250,000-scale quadrangle spans the transition from the deformed rocks of the foothills of the northern Brooks Range into the undeformed rocks of the Arctic coastal plain. Rocks exposed in the quadrangle (fig. 1) are part of the gently south-dipping northern flank of the Colville basin, which is a major structural province of the Cenozoic foreland basin.

Base from U.S. Geological Survey, 1956  
Universal Transverse Mercator projection  
1927 North American Datum  
100,000-foot grid ticks based on Alaska coordinate system, zone 5



**DESCRIPTION OF MAP UNITS**  
Quaternary: Surficial deposits, undifferentiated (Holocene and Pleistocene)—Tundra-covered, fine-grained, organic-rich silt, loess, and local colluvium and fine-grained alluvial sand and silt in areas adjacent to upland slopes. Overlies several levels of terrace deposits up to about 150 ft above stream level adjacent to the Colville River.

**CORRELATION OF MAP UNITS**  
UNCONSOLIDATED DEPOSITS: Quaternary (Q) includes Quaternary sediments, undifferentiated (Qs), and Quaternary sediments, undifferentiated (Qd).  
BEDROCK: Includes units from the Quaternary (Q) down to the Permian (P).

**EXPLANATION OF MAP SYMBOLS**  
Contact—Approximately located  
Faults—Dashed where approximately located  
Normal fault—U, upthrown side; D, downthrown side  
Thrust fault—Teeth on upper plate  
Thrust fault—Approximately located. Arrows indicate relative movement

**REGIONAL SETTING**  
The geology of the Ikiipuk River 1:250,000-scale quadrangle spans the transition from the deformed rocks of the foothills of the northern Brooks Range into the undeformed rocks of the Arctic coastal plain. Rocks exposed in the quadrangle (fig. 1) are part of the gently south-dipping northern flank of the Colville basin, which is a major structural province of the Cenozoic foreland basin.

Figure 1.—Chronostratigraphic column for the Colville basin, northern Alaska. Red box shows stratigraphic section in the Ikiipuk River quadrangle. Abbreviations or symbols are as follows: <—>, uncertainty relationship; CS, cobblestone sandstone of Fortress Mountain Formation (informal unit of Mull and others, in press); ms, mangrove-form shale unit (informal term); Kms, Kims Sandstone formation as revised by Molenaar and others (1987); LCU, Lower Cretaceous unconformity. Geologic time scale from Gradstein and Ogg (1996).

Figure 2.—Small displacement thrust fault in dark-gray, organic-rich shale with thin interbeds of yellow tuff in lower part of Seabee Formation. Exposure on September Creek in T. 3 S., R. 11 W. Red is divided into 1-ft increments. Photograph by Paul Decker (Alaska Department of Natural Resources, Division of Oil and Gas).

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By  
Charles G. Mull,<sup>1</sup> David W. Houseknecht,<sup>2</sup> G.H. Pessel,<sup>3</sup> and Christopher P. Garrity<sup>2</sup>

<sup>1</sup>Alaska Division of Oil and Gas, Anchorage, AK 99501, <sup>2</sup>U.S. Geological Survey, Reston, VA 20192, <sup>3</sup>Alaska Division of Geological and Geophysical Surveys, Fairbanks, AK 99709

