

**Quaternary**  
Qal Alluvium  
Silt, sand, and gravel of stream beds, flood plains, and terraces. Includes marine beach deposits.

**Quaternary (?)**  
Qla Lava flows and ash deposits  
Interbedded lava flows and ash deposits. Qla. Youngest lava flows capping ash deposits. Qv. Cinder cones are common throughout and original shapes are well preserved.

**Cretaceous (?)**  
Ks Intrusive rocks  
Intrusive rocks of unknown composition. May correlate with granite, quartz diorite, diorite, dacite, and andesite intrusives reported by Harrington (1918) immediately south of the Unalakleet quadrangle.

**Cretaceous**  
Ks Shaktolik group  
Gneiss, shale, silt, and conglomerate. Coarse clastic rocks form rubble-covered ridges and hills; shale forms slopes and valleys. Outcrops rare.  
The rocks of the Shaktolik group were described by Smith and Eakin (1911) and by Patton and Bickel (1956) in the type section on the Shakoluk River immediately north of the Unalakleet quadrangle; by Martin (1954) and by Patton and Bickel (1956) along the lower Yukon River north and northeast of the Unalakleet quadrangle; and by Harrington (1918) immediately south of the Unalakleet quadrangle. Martin (1954, chart opposite p. 474) divided the Upper Cretaceous rocks above the Unalakleet conglomerate into the Kalluk, Naluk, and Midek formations and stated that these three are contemporaneous with the Shaktolik group. Smith (1959) did not accept the three formations of Martin as more than a theoretical subdivision. Before 1911 the Shaktolik group was considered to be Tertiary in age. These rocks were then shown to be Late Cretaceous in age by Stanton and Knowlton primarily by studies of plant fossils collected by Collier (1908). Imay and Reeside (1954) reclassified the marine mollusks of the fossil collections of Collier as late Early Cretaceous in age. Patton and Bickel (1956) state that the lower and middle units of the Shaktolik group have been assigned a late Early Cretaceous age, on the basis of identification of marine mollusks by R. W. Imay, while the upper units of the Shaktolik group, on the basis of plant remains studied by R. W. Brown, are considered to be Late Cretaceous in age. Detailed stratigraphic information is insufficient to warrant mapping Martin's three formation equivalents of the Shaktolik group within the Unalakleet quadrangle. Thickness unknown but estimated by Martin (1954) to be more than 4,800 feet along the lower Yukon River.

**Carboniferous (?) or younger**  
mi Metamorphosed igneous rocks  
Gneiss and granitic gneiss. Described by Smith and Eakin (1911) immediately northeast of Unalakleet quadrangle; are given as post Carboniferous. Described by Harrington (1918) immediately south of the Unalakleet quadrangle; age given as Carboniferous. Described by Madden (1919) immediately east of the Unalakleet quadrangle; age given as Devonian (?) Silurian (?)

**Age unknown**  
vr Volcanic rocks  
Chiefly basalt and andesite. Rarely rhyolite, tuff, chert, agglomerate, and breccia. In some places flat lying or gently dipping and unaltered, elsewhere highly folded, faulted, and altered, indicating that the rocks are probably of several different ages.

**Contact**  
Long dashes where approximately located; short dashes where graded, limited or inferred.

**Fault**  
Long dashes where approximately located; short dashes where inferred; dotted where concealed; arrows show relative displacement.

**High-angle fault**  
Dashed where approximately located; dotted where concealed; u, up-thrown side; d, down-thrown side.

**Thrust or low-angle reverse fault**  
Dotted where concealed; r, upper plate.

**Anticline showing crest line and direction of plunge**  
Long dashes where approximately located; short dashes where inferred; dotted where concealed.

**Syncline showing trough line and direction of plunge**  
Long dashes where approximately located; short dashes where inferred; dotted where concealed.

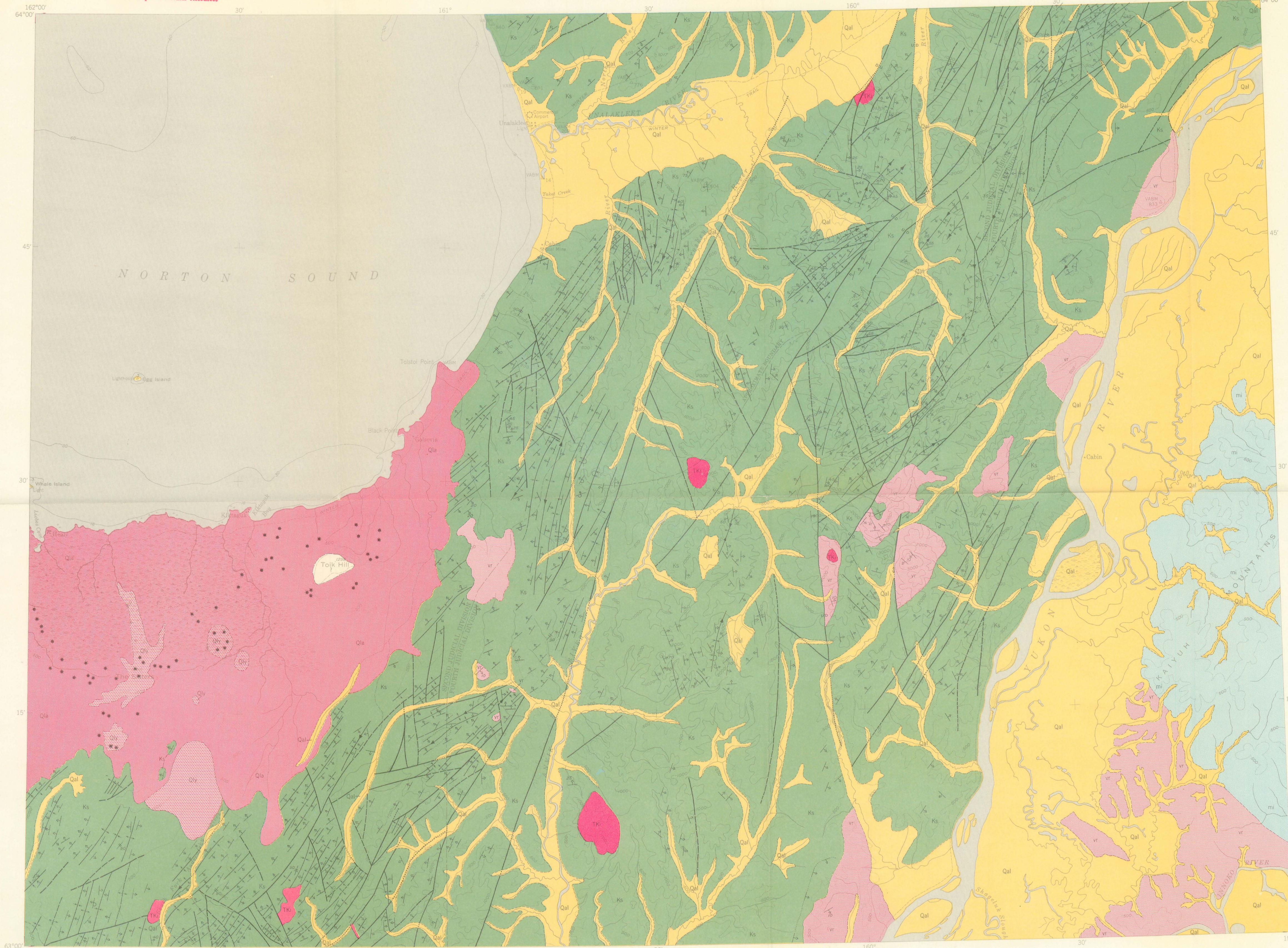
**Overturned anticline showing crest line and direction of dip of limbs**  
Dotted where concealed.

**Overturned syncline showing trough line, direction of dip of limbs, and plunge**  
Dotted where concealed.

**Approximate strike and dip of beds based on photo-interpretation**  
Strike of vertical beds based on photo-interpretation.

**Strike and dip of overturned beds based on photo-interpretation**  
Cinder cone.

**Trace of conspicuous beds**  
Note: Symbol indicating map unit or direction of dip is questioned if identification of unit or direction of dip doubtful.



Base map by Topographic Division  
U.S. Geological Survey

Geology compiled in 1955

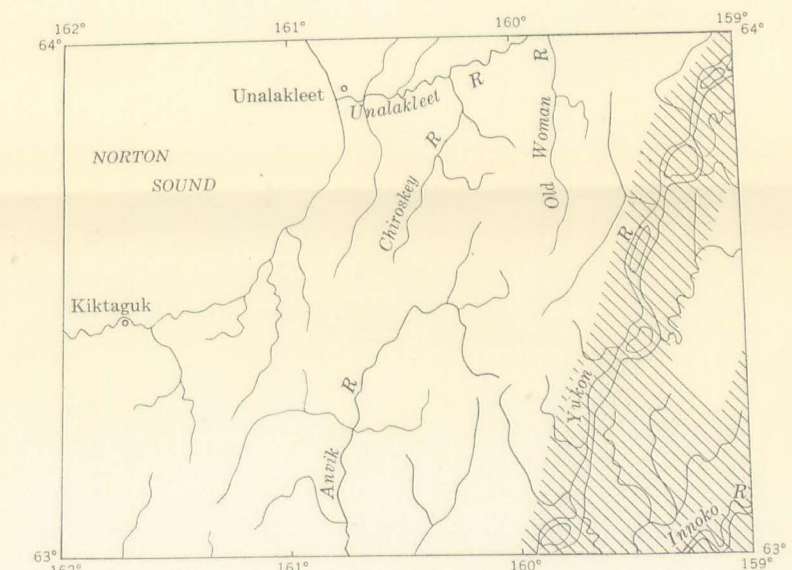


FIGURE 1. INDEX MAP OF THE UNALAKLEET QUADRANGLE SHOWING SOURCE OF PUBLISHED INFORMATION

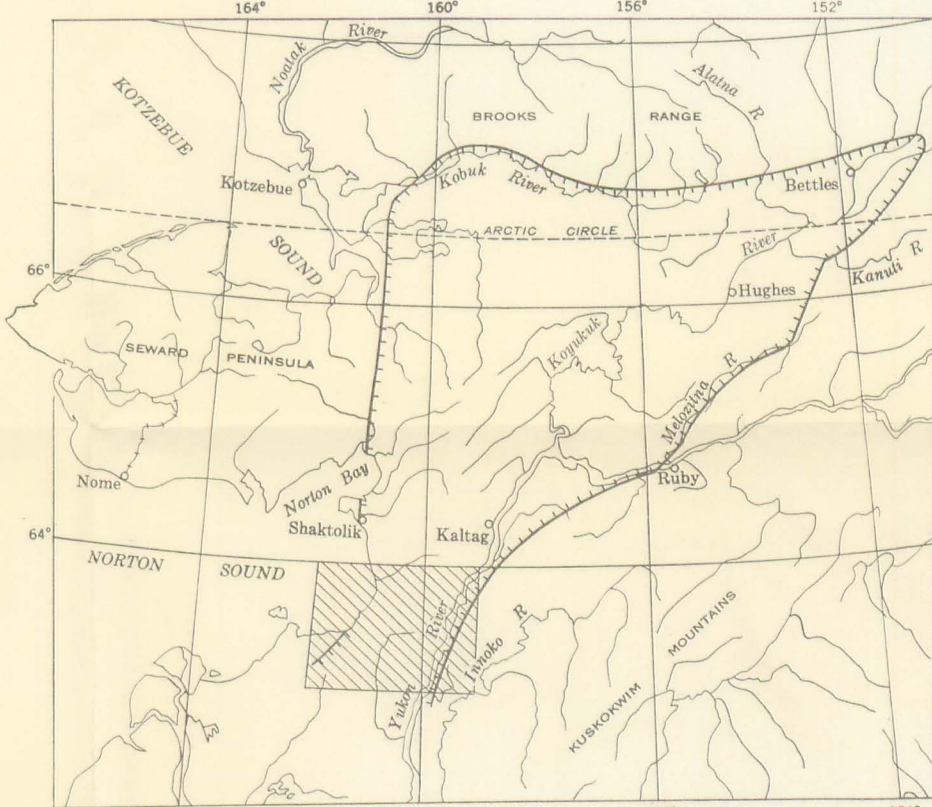


FIGURE 2. INDEX MAP SHOWING POSITION OF THE UNALAKLEET QUADRANGLE IN THE KOYUKUK CRETACEOUS BASIN

#### INTRODUCTION

The Unalakleet quadrangle is one of a group of maps compiled to make available for public use information from reports on early ground surveys that are mostly out of print and new information obtained by interpretation of aerial photographs that have become available since the ground surveys. Interpretation of the aerial photographs has made possible the extension of formations beyond the limits mapped from ground surveys and has added much new information, especially data on the structure of the rocks. Descriptions of the rocks in this quadrangle are taken mainly from a report on an earlier ground survey and therefore may be valid only within the limits of that survey (see fig. 1). Although a formation may be recognized on aerial photographs beyond the limits of an earlier ground survey, it is not possible to determine from the photographs whether or not the rocks of the formation in the extended area differ somewhat from the rocks recognized in the ground survey.

#### SOURCES OF INFORMATION AND METHOD OF COMPILATION

Preliminary photogeologic studies of the southern part of the Koyukuk Cretaceous basin were begun in the spring of 1954. These studies were made on 1:40,000-scale, vertical and trimetrogon aerial photographs. The Unalakleet quadrangle was not visited in the field but field checking was done near the north border of the quadrangle during the summer of 1954. The final compilation, based on photo-interpretation, published data, and unpublished data, was completed on the 1:250,000 scale, U.S. Geological Survey Alaska Reconnaissance Topographic

Series map of the Unalakleet quadrangle during the winter of 1954-1955. Information used to supplement the present study was obtained from the source shown on the index map.

#### STRUCTURE

The Unalakleet quadrangle lies on the southwestern corner of the Koyukuk Cretaceous basin (see fig. 2). The rocks in the eastern part of the quadrangle are older than the Cretaceous and similar rocks probably underlie the Cretaceous rocks throughout at least part of the basin. The bedding traces or flow structures of the pre-Cretaceous rocks within the quadrangle are poorly exposed because of low relief and general absence of resistant members. Highly complex structure is indicated by the tight folding and faulting observed at the few bedrock exposures and by the high degree of metamorphism that has been produced throughout these rocks. The dominant structural feature of the rocks of Cretaceous age within the map area is the general northeasterly trend of the fold axes. The beds are tightly folded and overturned in many places. Fold axes plunge steeply and reversals of plunge along the axes are common. Thrust faults and strike-slip faults with large stratigraphic throw occur throughout the quadrangle. Many of these faults appear to be genetically related to the folding. These faults are both along the trend and across the trend of the folding. Thrust movement is generally eastward. Exposures in the stream cuts show that many of the major folds have been faulted along the strike of the beds, but these faults are not apparent on the ridges and hills. Many of these strike faults are reverse faults. Several normal faults with large stratigraphic displacement

have been mapped. Numerous smaller normal and reverse faults in the quadrangle could not be shown at the scale of this map. Recent adjustment along normal faults in the northeastern part of the Unalakleet quadrangle is indicated by scarps formed in alluvial fans of Quaternary age.

#### LITERATURE CITED

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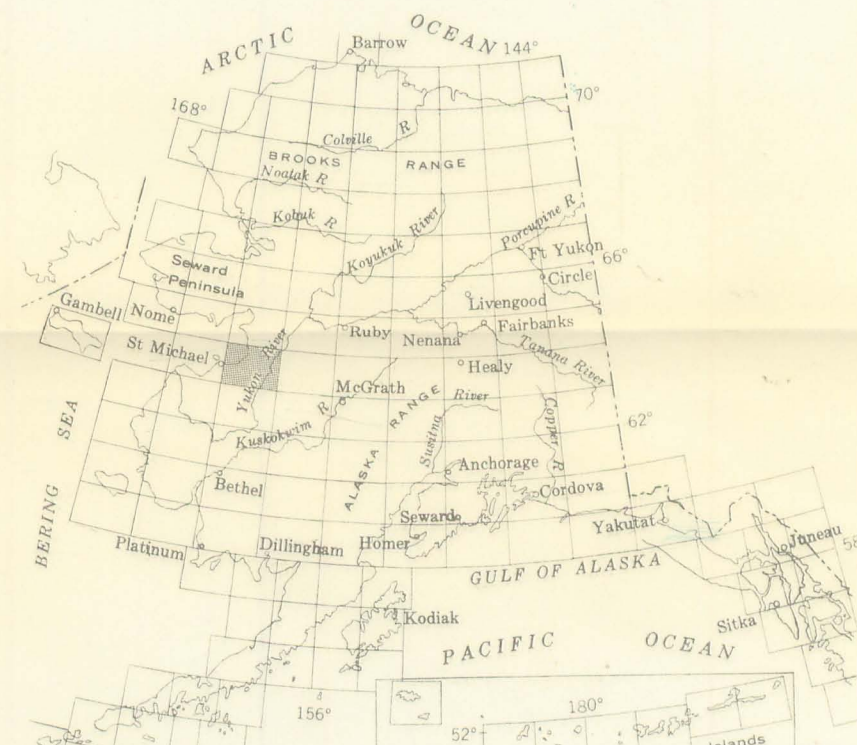


FIGURE 3. INDEX MAP OF ALASKA SHOWING LOCATION OF THE UNALAKLEET QUADRANGLE

## RECONNAISSANCE GEOLOGIC MAP OF THE UNALAKLEET QUADRANGLE, ALASKA

By  
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Scale 1:250,000

0 5 10 15 20 Miles

Contour intervals 200 and 1000 feet  
Dashed lines represent half-interval contours  
Dotted lines mean sea level  
Depth curves in feet-dates in mean lower low water  
Shoreline shown represents the approximate line of mean high water

1959