MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-290

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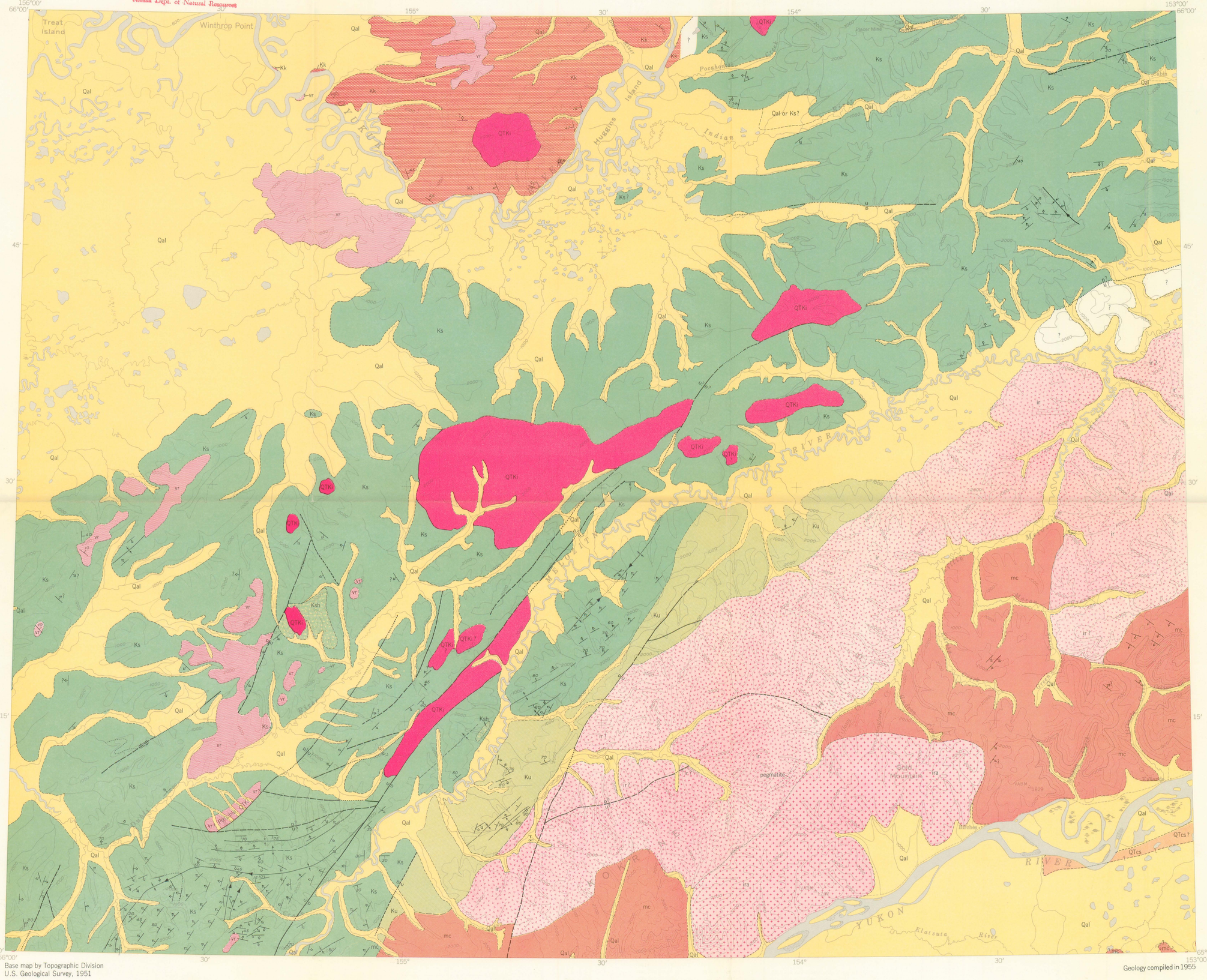
Division of Mines and Minerals
Alaska Dept. of Natural Resources



Base map by Topographic Division
U.S. Geological Survey, 1951

Geology compiled in 1955

EXPLANATION

Qal — **Alluvium**
Silt, sand, and gravel of stream beds, flood plains and terraces. Locally includes some glacial deposits

QUATERNARY

QTcs — **Clay, silt, sandstone, conglomerate and lignite**
Poorly consolidated nonmarine sediments exposed at Palisades, a cut-bank several hundred feet high on south bank of Yukon River between Birches and Kallands (Eakin, 1916; Eardley, 1938). According to Eardley exposed section is approximately 800 feet thick. Lower 600 feet is steeply dipping and is overlain unconformably by 200 feet flat lying sediments. Lower 600 feet thought to be Tertiary because of similarity to coal-bearing Tertiary rocks in Alaska Range. Age of upper 200 feet may be Quaternary

TERTIARY(?) AND QUATERNARY(?)

QTKi — **Intrusive rocks**
Granite, some diorite. Also includes numerous unmapped dikes of varying composition and texture. Probably Late Cretaceous or early Tertiary in age but may be considerably younger (Eakin, 1916). Not conspicuous topographically

CRETACEOUS(?) TERTIARY(?) AND QUATERNARY

Ks / Ksh — **Shaktolik group**
Graywacke, shale, grit, and conglomerate, Ks. Locally contact metamorphosed to hornfels, Ksh, where intruded by granite. Coarse clastic rocks form rubble-covered ridges and hills, shale forms slopes and valleys. Outcrops rare. Described by Schrader (1900) along lower Koyukuk River, by Smith and Eakin (1911) and by Patton and Bickel (1956a) at the type section on Shaktolik River 125 miles west of the Melozitna quadrangle, by Martin (1926) and by Patton and Bickel (1956b) along lower Yukon River immediately south of Melozitna quadrangle. Smith and Eakin (1911) placed all Cretaceous rocks above the Ungalik conglomerate in the Shaktolik group. Martin, (1926, chart opposite p. 474) divided Upper Cretaceous rocks above Ungalik conglomerate into the Kallag, Nulato, and Melozi formations and stated that these three are contemporaneous with the Shaktolik group. Smith (1939) did not accept the three formations of Martin as more than a theoretical subdivision. Before 1902 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 from studies of plant fossils collected by Collier. Imlay and Reeside (1954) reclassified the marine mollusks of the fossil collections of Collier as late Early Cretaceous (Albian) in age, on the basis of identification of marine mollusks by R. W. Imlay, 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. Martin mapped his three formational equivalents of the Shaktolik group along the north bank of Yukon River a short distance south and southwest of the Melozitna quadrangle, but detailed stratigraphic examination has been insufficient to warrant mapping them within the quadrangle. Thickness unknown but estimated by Martin (1926) to be more than 4,800 feet along lower Yukon River

CRETACEOUS

Ku — **Ungalik conglomerate**
Conglomerate, grit, and some graywacke. Forms pinnacled ridges where relief is great. Composed of angular to rounded debris derived from older rocks immediately adjacent to conglomerate. Boulders to 2 feet in diameter. Sorting and bedding poor. Described by Smith and Eakin (1911) from type section on Ungalik River near Norton Bay, where thickness is believed to be several hundred feet. Described by Eakin (1916, p. 42) in the Melozitna quadrangle. Thickness stated as several feet to 60 feet overlain by finer beds laid down contemporaneously with another part of the conglomerate a short distance away. No total thickness estimated. Described along the Yukon River by Martin (1926, p. 395). Thickness estimated at 3,000 feet but this thickness may include part of the overlying Shaktolik group. Author estimates a thickness of at least 200 feet in the Melozitna quadrangle

Kk — **Koyukuk group**
Basalt, basalt porphyry, tuff and agglomerate, generally greenish gray, rarely grayish red. Greenish-gray graywacke and conglomerate. Dark gray mudstone. Locally thin lenses of reddish-weathering, greenish-gray fossiliferous impure limestone (Patton, W. W., and Mangus, M.D., 1953, written communication). Described by Schrader (1904) along Koyukuk River in the Melozitna quadrangle where thickness was estimated at more than 800 feet

ir / ira — **Intrusive rocks**
Includes granite, monzonite, and some diorite, ir. Locally altered to augen gneiss and mica schist, ira. Locally contains younger granitic dikes not shown at scale of map. Strongly jointed. Described by Eakin (1916). Associated with older metamorphic complex

PRE CRETACEOUS

mc — **Metamorphic complex**
Schist, recrystallized limestone, quartzite, and greenstone. Associated with younger granitic intrusive rocks. Eakin (1916) tentatively correlates these rocks with Devonian section in Iditarod-Ruby region or with Birch Creek schist in the Yukon-Tanana region

PRECAMBRIAN OR PALEOZOIC

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 and faulted and altered, indicating that the rocks are probably of several different ages

AGE UNKNOWN — Upper Precambrian or Lower Paleozoic

Contact
Long dashes where approximately located; short dashes where gradational or inferred; dotted where concealed; queried where doubtful

Contact
Derived from aerial photographs with no field evidence

Fault
Long dashes where approximately located; short dashes where inferred; dotted where concealed; arrows show relative movement

High-angle fault
Long dashes where approximately located; short dashes where inferred; dotted where concealed; u, upthrown side; d, downthrown side. u and d indicate that direction of movement is doubtful

Anticline showing crest line and direction of plunge
Long dashes where approximately located

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

Strike and dip of beds based on field measurement

Approximate strike and dip of beds based on photointerpretation

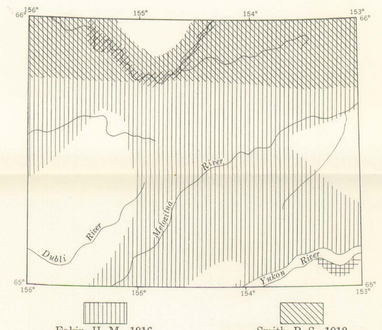
Strike of vertical beds based on field measurement

Strike of vertical beds based on photointerpretation

Thermal spring

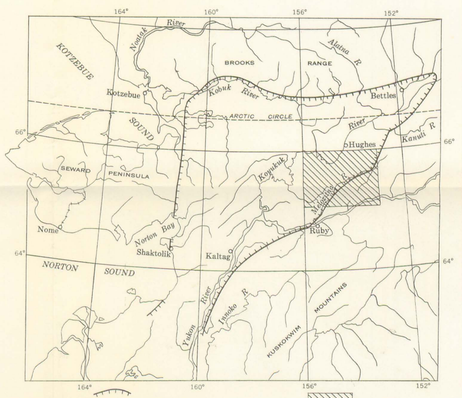
Trace of conspicuous beds

Note: Symbol indicating map unit or direction of dip is questioned if identification of unit or direction of dip is doubtful



Eakin, H. M., 1916
Smith, P. S., 1913
Patton, W. W., and Mangus, M. D., 1953, unpublished notes
Eardley, 1938

FIGURE 1. INDEX MAP OF THE MELOZITNA QUADRANGLE, SHOWING REPORTS USED IN COMPILATION



Approximate boundary of Koyukuk Cretaceous basin
Area covered by this report

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

INTRODUCTION

The Melozitna 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 are taken mainly from reports on the earlier ground surveys and therefore may be valid only within the limits of those surveys (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 the rocks of the formation in the extended area differ somewhat from the rocks recognized in the ground survey.

The writer is indebted to the U. S. Army, 30th Engineer Group for the valuable assistance it gave in helicopter and fixed-wing aircraft transportation and for the use of the 549th Topographic Engineer Company field camps during the summer of 1954.

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 done on north-south flights of 1:40,000 scale vertical and trimetrogon aerial photography. Three months were spent in field checking the photogeology in the summer of 1954, and approximately two weeks of this field time were spent in the Melozitna quadrangle. Helicopter transportation greatly facilitated the field work. The final compilation, based on photointerpretation, helicopter field checking, published and unpublished data, was completed on the 1:250,000 scale, U. S. Geological Survey Alaska Reconnaissance Topographic Series map of the Melozitna quadrangle during the winter of 1954-55. Published information used to supplement the present study was obtained from sources shown on the index map of the quadrangle (fig. 1).

STRUCTURE

The Melozitna quadrangle lies on the southeastern side of the Koyukuk Cretaceous basin. The quadrangle includes the Kokrine Hills which form the southeastern boundary of the basin and the south flank of the Hogatza uplift (Payne, 1955), a structural high occupying the center of the basin.

Traces of bedding of the sedimentary rocks in the quadrangle are partly obscured because of low relief, and the effects of contact metamorphism by the many granitic intrusions. Tight, steeply plunging folds characterize the sedimentary and metamorphic rocks where the bedding can be traced.

The dominant structural feature in the Melozitna quadrangle is the northeasterly trend of the fold axes and faults. In the southwest corner of the quadrangle the axes in the Cretaceous rocks deviate from this regional trend and trend eastward for approximately 12 miles. The Cretaceous rocks also deviate from the regional northeasterly trend along the Koyukuk River in the northern part of the quadrangle.

At least two stages of faulting are expressed within the quadrangle. Reverse faults and strike-slip faults of the earlier period are genetically related to the folding. In the exposures along the Melozitna River these faults are so numerous that the fold axes cannot be determined in many places. Few of the faults of this age are apparent on the hills and ridges away from the stream cuts and few have been mapped. Normal faults of the later period of folding are roughly parallel to the fold axes. Just south of the Melozitna quadrangle, on the southward extension of many of these faults, recent movement has formed scarps in the Quaternary alluvial fans.

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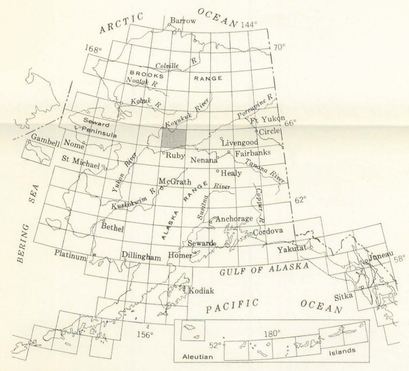

FIGURE 3. INDEX MAP SHOWING LOCATION OF THE MELOZITNA QUADRANGLE, ALASKA

RECONNAISSANCE GEOLOGIC MAP OF THE MELOZITNA QUADRANGLE, ALASKA

By
John T. Cass

Scale 1:250000

5 0 5 10 15 20 Miles

Contour intervals 200 and 1000 feet
Dotted lines represent half-interval contours
Datum is mean sea level

1959 magnetic declination varies from 24° to 26° east

1959

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