----- Contact, approximate contact, inferred contact, or indefinite contact

Strike and dip of beds. May include overturned beds

Strike and dip of vertical beds

Strike and dip of foliation

Horizontal beds

Fault, approximately located or inferred. Dotted where concealed. Arrows indicate apparent direction of offset. U, upthrown side; D, downthrown side

\_\_.\_\_. Prominent lineament in surficial deposits in Dulbi Flats. May be the result of recent faulting

 $\leftarrow - \updownarrow$  . Anticline showing direction of plunge. Approximately located or inferred; dotted where concealed

Syncline showing direction of plunge. Approximately located or inferred; dotted where concealed

extstyle ext

Invertebrate fossil locality. Number refers to fossils in table 3

Location of potassium-argon age sample. Number refers to samples in table 4

Strike and dip of prominent foliation or bedding based upon photointerpretation or distant observation

Locality of sample for chemical analysis and CIPW norms. Number refers to sample list

Locality of sample of Cretaceous sedimentary rock for modal analysis. Number refers to samples in table 2

TABLE 1. RAPID ROCK CHEMICAL ANALYSES AND CIPW NORMS OF SELECTED VOLCANIC AND PLUTONIC ROCK SAMPLES [Sample locations are shown on map as . Analyses by Hezekiah Smith] 2 3 4 5 6 7 8 9 10 11 12 13 14 Lat. N 65°14' 65°40' 65°49' 65°45' 65°49' 65°30' 65°32' 65°37' 65°02' 65°40' 65°18' 65°19' 65°23' 65°14' Long. W 155°24' 155°12'154°00' 153°38' 153°04' 155°00' 154°35' 154°29' 155°00' 153°59' 154°25' 154°04' 153°50' 153°35'

47.6 - 34.2 20.7 27.5 | 19.7 21.4 22.0 | - | 17.4 | 32.6 33.5 21.6 28.9 25.7 14.9 25.8 10.9 21.4 8.4 7.2 11.8 .8 17.1 31.5 29.5 29.9 24.4

1 Altered rhyolite flow or 6 Andesite porphyry flow 2 Vesicular basalt flow 7 Altered andesite breccia 3 Rhyolite flow or welded tuff
8 Dacite porphyry flow or hypabyssal rock 4 Andesite porphyry flow 9 Altered spilitic basalt 5 Dacite porphyry flow 10 Hornblende-biotite granodiorite

12 Biotite quartz monzonite 13 Biotite quartz monzonite 14 Altered biotite quartz monzonite

11 Biotite quartz monzonite

65°50' N.; 154°37' W.

65°27' N.; 155°17' W.

TABLE 2. MINERALOGICAL COMPOSITION (IN PERCENT) OF 6 SAMPLES OF TYPICAL CRETACEOUS SANDSTONE AND GRAYWACKE [Sample locations are shown on map as 43. Composition based on counts of 600

points per thin section]							
Map Unit Field No.		Kqc	74APa 168	Kc	Kgm		
		68APa 104		68APa 25	68APa 15	68APa 45	68APa 33
Sample No.		1 .	2	3	. 4	, <b>5</b>	6
Lat. N and Long. W		65°40' 153°50'	65°01' 155°21'	65°27' 154°23'	65°57' 153°09'	65°16' 155°05'	65°19 154°55
Quartz, quartzite		64	65	49	• 33	25	9
Chert		-	3	3	1	<1	9
Feldspar		-	7	9	6	23	10
Rock fragments	Volcanic	-	1	10	9	28	14
	Sedimentary	<1	3	7	5	3	4
	Metamorphic (except carbonate)	<1	2	3	10	-	2
	Plutonic	-	-	-	-	-	<1
Mica		-	6	. 9	4	2	6
Carbonate		-	-	-	-	-	10
Argillaceous material		35	12	10	31	. 17	24
Miscellaneous (chiefly heavy minerals)		0.	1	1	2	1	12

TABLE 3. CRETACEOUS INVERTEBRATE FOSSIL COLLECTIONS [Sample locations are shown on map as  $ullet^1$ . Fossils identified by D. L. Jones and R. W. Imlay, U.S. Geological Survey]

No.	Collection No.	Locality No.	Fossils	Latitude and Longitude	
		Igneous pebble	-cobble conglomerate (Kc)		
1	68AMm61	Mes. loc. M5041	Indet. pelecypods - some resemble <u>Arctica</u>	65°03' N.; 155°03' W.	
	•	Andesit	ic volcanic rocks (Kv)		
2	53APa433 65AMml0F	Mes. loc. 24686 Mes, loc. M2962	Buchia sublaevis belemnite	65°52' N.; 154°34' W.	
3	53APa436	Mes. loc. 24687	Buchia cf. B. crassicollis	65°51' N.; 154°35' W.	
4	65AMmllF	Mes. loc. M2963A	Buchia sublaevis	65°50' N.; 154°36' W.	

65AMm12F

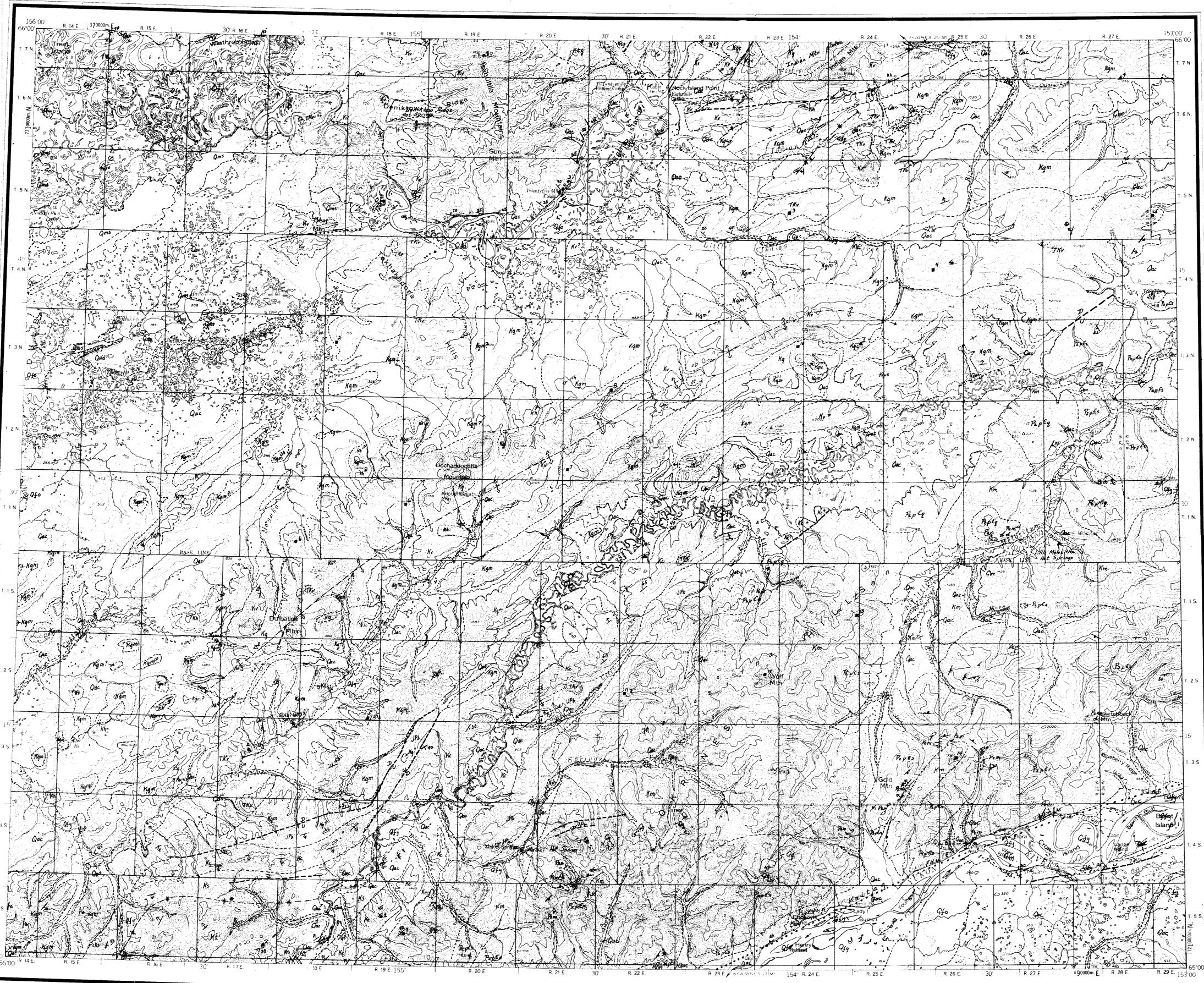
65°59' N.; 154°49' W. TABLE 4. POTASSIUM-ARGON AGE DETERMINATIONS [Sample locations are shown on map as  $\Delta^2$ .  $K^{40}$  decay constants:  $\lambda = 0.572 \times 10^{-10} \text{ year}^{-1}$ ;  $\lambda_{\rm g} = 4.963 \times 10^{-10} \, {\rm year}^{-1}$ . Abundance ratio:  ${\rm K}^{40}/{\rm K} = 1.167 \times 10^{-4}$  atom percent. Potassium

Mes. loc. M5040 Buchia keyserlingi

No.	Field No.	Latitude and Longitude	Mineral	Map Unit	K <sub>2</sub> O Percent	Ar <sup>40</sup> rad (moles/gm) 10 <sup>-10</sup>	Ar <sup>40</sup> rad A <sup>40</sup> total	Calculated Ad (millions of years)
1 68AMm	68AMm31	65°20' N.; Mm31 155°23' W.	Biotite	Кg	8.19 <u>8.22</u> avg. 8.205	9.945	.91	82.3±3
	OGRANISI		Hornblende		.306 .312 avg309	.4155	.43	89.0 ± 3
2	68AMm67	65°18' N.; 154°25' W.	Biotite	Km	7.74 <u>7.77</u> avg. 7.755	12.77	.87	111 ± 3

Base from U.S. Geological Survey 1:250,000

Alaska topographic series; Melozitna, 1956.



GEOLOGIC MAP OF THE MELOZITNA QUADRANGLE, ALASKA

SCALE 1:250000

CONTOUR INTERVAL 200 FEET DOTTED LINES REPRESENT 100 FOOT CONTOURS CATUM IS MEAN SEALEVEL

> This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey standards and nomenclature.

Field mapping by W.W. Patton, Jr., 1953, 1958,

1953. Map compiled by W.W. Patton, Jr., 1976.

1781 151

1.6 155

UNCONFORMITY

DESCRIPTION OF MAP UNITS Surficial deposits (Mapped largely by interpretation of aerial photographs)

Qfy YOUNGER FLOOD-PLAIN DEPOSITS--Light-gray micaceous silt. Sand and gravel along streams that drain bedrock uplands. Characterized physiographically by bars, oxbow lakes, meander scrolls, abandoned channels, and other evidence of recent flood-plain building Qfo OLDER FLOOD-PLAIN DEPOSITS--Chiefly light-gray and grayish-orange micaceous silt. Locally include peat, reworked eolian sand, and gravel. Deposits at or near river level but youthful flood-plain features such as oxbow lakes, meander scrolls, and abandoned channels are much modified or absent. Contact with younger flood-plain deposits (Qfy) locally gradational and poorly defined Qms MODIFIED EOLIAN SAND DEPOSITS--Dark-yellowish-orange and light-gray, fine- to medium-grained eolian sand. Forms broad sheetlike dune field mantling older flood-plain (Qfo) and alluvial terrace (Qac) deposits of the Dulbi Flats. Deposits have strong northeast-southwest trend UNDIFFERENTIATED ALLUVIAL, COLLUVIAL, AND EOLIAN TERRACE AND SLOPE DEPOSITS--Chiefly silt and very fine sand. Terrace deposits believed to be largely fluviatile but may be in part lacustrine; slope deposits chiefly eolian and colluvial. The steep frozen banks of the Palisades along the Yukon River (locally known as the "boneyard") have yielded a Pleistocene vertebrate fauna including mammoth and bison remains Qg GLACIAL DRIFT--Unsorted bouldery till and isolated moraines; may include some younger solifluction

Volcanic and sedimentary rocks SANDSTONE, CLAYSTONE, CONGLOMERATE AND LIGNITE--Includes grayish-white granule conglomerate and sand-stone, reddish-brown claystone, and lignitic coal. Exposed at river level at the Palisades along the Yukon River. Pollen of probable Miocene age (E. Leopold and E. Daniels, written commun., 1976)

deposits near valley sides

(Kg). Age is probably early Late Cretaceous

VOLCANIC ROCKS Indian River, Takhakhdona Hills, and Dulbi River areas—Chiefly light-gray to pink rhyolite tuff, welded(?) tuff, flows, and breccia (table 1, nos. 1 and 3). Subordinate pumice, dark vitrophyre, and obsidian.—Obsidian occurrence north of Little Indian River possible source of obsidian artifacts and chippings found in archeological site in northwestern Alaska (Patton and Miller, 1970). In Takhakhdona Hills unit also includes dark-green to black vesicular basalt flows (table 1, no. 2). Probably Tertiary in age

<u>Big Creek - Tokhatjikh Creek area</u>—Chiefly dark-gray to green dacite and andesite porphyry flows and crystal tuffs (table 1, nos. 4 and 5). Probably correlative with similar flows and tuffs in adjoining Tanana and Bettles quadrangles which have a potassium-argon date of 58 m.y. (early Tertiary) (Patton and Miller, 1973). Locally unit may include rocks as old as Late Cretaceous Other areas—Small bodies of rhyolite and dacite flows and hypabyssal rocks QUARTZ-PEBBLE CONGLOMERATE--Small isolated patches of light-gray quartz-pebble conglomerate and quartzose sandstone (table 2, no. 1). Minor intercalated light-colored ashy tuff. Conglomerate made up almost wholly of quartz and quartzite clasts. Intruded and thermally altered by granodiorite

SANDSTONE, QUARTZ CONGLOMERATE, SHALE, AND SILTSTONE--Normarine deposits of olive-green, fine- to coarse-grained, crossbedded, quartzose sandstone and grit (table 2, no. 2); quartz-pebble conglomente, and dark micaceous shale and siltstone. Ironstone lenses and concretions. Abundant carbonized plant debris. Distinguished from volcanic graywacke and mudstone unit (Kgm) by better sorting and by a higher percentage of quartz. Probably correlative with Upper Cretaceous, plant-bearing nonmarine strata in adjoining Kateel River quadrangle (Patton, 1966) IGNEOUS PEBBLE-COBBLE CONGLOMERATE--Massive poorly sorted conglomerate with pebble- to cobble-size clasts chiefly of mafic intrusive and extrusive rocks and varied colored chert. Clasts of quartz, quartzite, granitic rocks, schist, and limestone locally abundant but generally occur in minor amounts. Interbedded fine-grained to gritty, dark-gray to green graywacke (table 2, no. 3) and mudstone. Unit grades upward into the sandstone, quartz conglomerate shale, and siltstone unit (Ks). In part overlies and in part laterally gradational with volcanic graywacke and mudstone unit (Kgm).

Bulk of this unit believed to be late Early Cretaceous (Albian) but may include beds as young as Late Cretaceous. Indeterminable pelecypods (table 3, no. 1)

VOLCANIC GRAYWACKE AND MUDSTONE--Chiefly dark-greenish-gray, fine-grained to gritty, poorly sorted

VOLCANIC GRAYWACKE AND MOUSIONE--Unietly dark-greenish-gray, fine-grained to gritty, poorly sorted graywacke composed largely of first- and second-cycle volcanic debris but locally containing abundant granitic and metamorphic rock debris (table 2, nos. 4-6). Graded bedding common. Dark-gray mudstone interbeds. Some intercalated crystal tuffs. Hornfels bordering granodiorite intrusives (Kg). Assigned a late Early Cretaceous (Albian) age based upon correlation with similar volcanic graywacke and mudstone units in adjoining Hughes (Patton and Miller, 1966) and Kateel River (Patton, 1966) quadrangles. Unit queried where poorly exposed in lowlands south of Koyukuk River TUFF, VOLCANIC GRAYWACKE AND MUDSTONE--Chiefly volcaniclastic rocks of andesitic and dacitic composition. Includes crystal-lithic tuff, lithic tuff, volcanic graywacke and mudstone. Rare andesite flows. Mapped only along northern edge of quadrangle and in adjoining parts of the Hughes quadrangle (Patton and Miller, 1966). Overlies andesitic volcanic rocks (Kv) and may grade laterally into volcanic graywacke and mudstone unit (Kgm). Assigned an Early Cretaceous age ANDESITIC VOLCANIC ROCKS Koyukuk River area--Pillow basalt and andesite flows; andesitic tuff, volcanic conglomerate and breccia; chert and fine-grained cherty tuff; and coquinoidal limestone composed largely of Buchia. Widely altered to a hard dark-green hornfels in Isahultila Mountains. Assigned an earliest Cretaceous (Neocomian) age based upon occurrence of Buchia (table 3, nos. 2, 3, 4, 5, 7) Dulbi-Melozitha Rivers area--Andesitic and dacitic tuff, breccia, volcanic conglomerate, and tuffaceous graywacke. Flows and hypabyssal bodies of andesite and dacite porphyry (table 1, nos. 6-8). Unit widely altered to a hard dark-green hornfels near granodiorite intrusives

(Kg). Assigned an earliest Cretaceous (Neocomian) age based upon occurrence of <u>Buchia</u> (table 3, no. 6) but may include strata as young as late Early Cretaceous (Albian) age JPb BASALT AND DIABASE--Spilitic basalt and diabase largely altered to greenstone (table 1, no. 9). Along contact with Melozitna pluton (Km), unit is thermally altered to a mafic hornfels. On Melozitna-Dulbi Rivers divide unit includes fine andesitic and basaltic tuffs and chert. Probably ranges in age from Permian to Jurassic and is correlative with a belt of similar mafic rocks that lies on strike to the portheast in the Tanana and Rettles guadrangles (Datton and Miller, 1973) strike to the northeast in the Tanana and Bettles quadrangles (Patton and Miller, 1973) JPu ULTRAMAFIC ROCKS--Small bodies of serpentinized peridotite and dunite with closely associated gabbro

Pzm MARBLE--Small masses of white to light-gray coarsely crystalline dolomitic and calcareous marble.

Locally altered to calc-silicate hornfels. Probably Paleozoic Pzp6s PELITIC SCHIST--Chiefly quartz-chlorite-nuscovite schist and micaceous quartzite. Greenschist facies of metamorphism. Subordinate micaceous quartzite. Subordinate glaucophane-chlorite-muscovite schist (lat. 65°13' N., 153°30' W.). Paleczoic or Precambrian. Unit cortains many small bodies of marble (Pzm) but only a few of these bodies have been mapped separately. Unit also includes many undifferentiated bodies of greenstone and greenschist which are believed to represent altered mafic igneous rocks and possibly are correlative with basalt and diabase unit (JPb) Papeq QUARTZITE--Chiefly fine-grained, light-gray quartzite and micaceous quartzite. Subordinate quartz-mica

schist, marble, and calc-silicate rock. Unit contact metamorphosed over broad areas. Stratigraphic relationship to pelitic schist (PzpEs) uncertain. Paleozoic or Precambrian PzpEn GNEISS AND QUARTZITE--Quartz-feldspar-biotite gneiss which is commonly garnetiferous and locally contains sillimanite. Almandine-amphibolite gneiss which is commonly garnetiferous and locally contains sillimanite. Almandine-amphibolite facies of metamorphism. Some augen gneiss. Gray coarse-grained quartzite with thin layers of biotite. Subordinate quartz-biotite schist and small undifferentiated bodies of marble and calc-silicate rock. Unit includes many bodies of gneissic and nongneissic quartz monzonite which have not been mapped separately. Contacts with pelitic schist (Pzp6s) and quartz monzonite (Km) are gradational and indefinite. Unit appears to underlie pelitic schist (Pzp6s). Broad structural relationships suggest that this unit may compose a northeasttrending gneiss dome

Kg GRANODIORITE--Chiefly fine- to medium-grained hornblende-biotite granodiorite (table 1, no. 10).
Subordinate quartz monzonite and quartz diorite. Assigned a Late Cretaceous age based upon a potassium-argon determination of 82.3 and 89.0 m.y. from the Dulbatna Mountain pluton (table 4, no. 1) and 81.5 m.y. from the Indian Mountain pluton in adjoining Hughes quadrangle (Patton and Miller 1966) HYPABYSSAL ROCKS--Small bodies chiefly of dacite and rhyolite porphyry. These intrusives are wide-spread in volcanic graywacke and mudstone unit (Kgm) and in andesitic volcanic rocks (Kv), but only a few have been mapped QUARTZ MONZONITE--Pinkish coarse-grained porphyritic biotite quartz monzonite (table 1, nos. 11-14).

Becomes gneissic in southern part of Melozitna pluton. Altered and slightly cataclastic in small pluton east of Gold Mountain. Assigned an Early Cretaceous age based upon a potassium-argon age of 111 m.y. from the Melozitna pluton (table 4, no. 2)

Note: The Kaltag fault is projected along the north bank of the Yukon River from the adjoining Ruby and Nulato quadrangles where its trace can be seen in the surficial deposits (Patton and Hoare, 1968). No evidence of the fault was found in the surficial deposits of the Melozitna quadrangle but its presence in the subsurface is strongly suggested by a steep gradient linear gravity anomaly which parallels the north bank of the Yukon River (Barnes, 1976).

CORRELATION OF MAP UNITS - CRETACEOUS - MESOZOIC

Barnes, D. F., 1976, Bouguer gravity map of Alaska: U.S. Geological Survey open-file report 76-70, scale 1:2,500,000. Patton, W. W., Jr., 1966, Regional geology of the Kateel River quadrangle, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-437. Patton, W. W., Jr., and Hoare, J. M., 1968, The Kaltag fault, west-central Alaska, <u>in</u> Geological Survey research 1968: U.S. Geol. Survey Prof. Paper 600-D, p. D147-D153. Patton, W. W., Jr., and Miller, T. P., 1966, Regional geologic map of the Hughes quadrangle, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-459. \_\_\_\_1970, A possible bedrock source for obsidian found in archeological sites in northwestern Alaska:
Science, v. 169, p. 760-761. \_1973, Bedrock geologic map of Bettles and southern part of Wiseman quadrangles, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-492.

O 5 10 15 20 25 KILOMETERS MAP OF MELOZITNA QUADRANGLE SHOWING LOCATION OF FIELD OBSERVATION POINTS (dots)

AND CONTINUOUS FOOT TRAVERSES (lines) Geology extended between field stations by aerial reconnaissance and by interpretation of aerial photographs. Surficial deposits mapped almost entirely from aerial photographs

