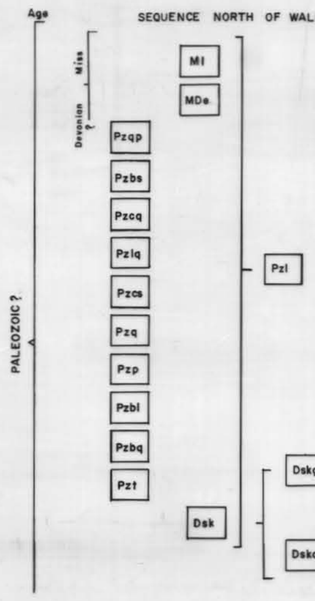
EXPLANATION

SEQUENCE NORTH OF WALKER FAULT



Ml Lisburne Group: light gray carbonates, cherty in part; fossiliferous in some localities.

MDe Endicott Group: includes Kayak Shale - black calcareous shale and red, hematitic shale, fossiliferous in part. Various meta-sediments and clastic rocks assumed to be equivalent to Kanayut Conglomerate and Hunt Fork Shale. Includes quartzites, quartzitic chert pebble conglomerates, siltstones, and phyllitic shales.

Pzqp white quartzite (field term): micaceous quartzite and quartzitic schist; typically highly contorted and crinkled. Includes significant amounts of biotite schist. Possibly equivalent to MDe.

Pzbs biotite schist (field term): plagioclase-biotite-amphibole schist. Also quartz-biotite-muscovite-plagioclase schist with porphyroblasts of plagioclase.

Pzcq chloritic quartzite (field term): schistose chloritic quartzite grading into quartzitic, micaceous schist locally. Typically blocky weathering and chloritic in outcrop, in thin section: quartz-plagioclase-muscovite-chlorite schist, porphyroblastic (?) in part. Includes boudins of greenstone: plagioclase-chlorite-epidote meta-igneous(?) rock.

Pzlq limestone-quartzite (field term): interlayered marbles, micaceous quartzites, and quartzose schist. In thin section: quartz-plagioclase-muscovite-chlorite-biotite-actinolite-amphibole-epidote assemblages. Some orange weathering marble locally; carbonates are dolomitic in part. Carbonate rocks are differentiated as Pzl where possible; possibly equivalent to Dskg and Dsko, and could be tectonic fragments.

Pzcs calc-schist (field term): various types of schist with appreciable amounts of calcite. In thin section: muscovite-quartz-epidote, chlorite-plagioclase-calcite-quartz, plagioclase-actinolite-biotite, quartz-actinolite-muscovite, etc. assemblages. Some layers and boudins of marble. Carbonates differentiated as Pzl where possible, and dolomitic in part.

Pzq gray and white quartzite, generally iron-stained, pyritic in part. May be equivalent to MDe.

Pzp phyllite: dark gray, shaley phyllite; massive white quartz veins common. May grade into Pzbl.

Pzbl black limestone: black, carbonaceous limestone, calcareous black shale and chert. Phyllitic in part and may grade into Pzp.

Pzbq black quartzite: laminated black and dark gray quartzite; apparently associated with Dsko, but stratigraphic position unknown.

Pzt greenstone: massive, dense, iron-stained dark to light gray rock. In thin section: quartz-plagioclase-epidote-clinopyroxene greenstone (meta-tuff/agglomerate?); plagioclase-quartz-clinopyroxene-epidote greenstone (meta-tuff/agglomerate) and semi-schistose quartz-plagioclase-epidote-biotite-actinolite greenstone??/hornfels??

Pzl undifferentiated carbonates: probably includes both Ml and Dsk.

Dsk Skajit Limestone: massive carbonates and marbles; assumed to be equivalent to Skajit Limestone, but no fossil evidence in the area.

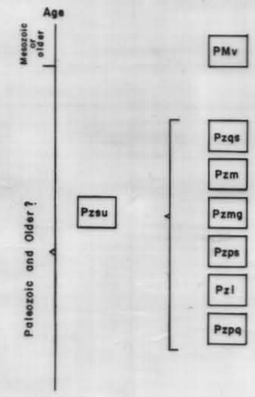
Dskg gray marble and limestone: massive gray carbonates with well developed platey fracture locally. Siliceous and carbonaceous material common. Generally minor amounts of dolomite, but dolomitic locally. Grades from crystalline limestone to marble. Altered in the vicinity of plutonic rocks, and typically hematitic in this phase. Thrust planes include brecciated, hematitic marbles. Minor amounts of metallic minerals(??) in altered zones.

Dsko orange weathering marble: buff weathering coarse grain marbles and dolomitic marbles. Generally massive, but grading to schistose varieties. Siliceous: contains sub-angular detrital (?) quartz grains. Chloritic in part, grading into chloritic calcareous schist locally.

Petrology by: T.C. Mowatt

NOTE: The stratigraphic sequence shown is apparent and may be the result of structural dislocation.

SEQUENCE SOUTH OF WALKER FAULT



PMv Feebly metamorphosed mafic volcanic and hypabyssal rocks with relict igneous textures and structures. Metabasalts and diabases. Incipient glaucophane growths on primary pyroxenes; epidote, actinolite, and stilpnomelane as dominant matrix assemblage minerals. Possibly Jurassic in age (Patton, Miller and Tailleur-1960), but may be older (Fritts-unpublished data).

Pzsu undifferentiated metasedimentary rocks, including pelitic schists, micaceous quartzites, calc-mica schists, chloritoid bearing schists, blueschists, and greenschists.

pelitic schists:	1)	quartz-mica-albite
	2)	quartz-mica-garnet-albite
	3)	garnet-chlorite-muscovite-quartz
micaceous quartzites:	1)	quartz-mica
chloritoid bearing pelitic schists:	1)	quartz-chloritoid-mica
	2)	muscovite-quartz-chloritoid-stilpnomelane
	3)	carbonate-chloritoid-mica-quartz
calc-schists:	1)	quartz-carbonate-mica-chlorite
	2)	garnet-chlorite-carbonate-epidote-quartz
greenschists:	1)	garnet-actinolite-quartz
	2)	actinolite-chlorite-epidote-albite-quartz (± garnet)
	3)	actinolite-carbonate-quartz-epidote
blueschists:	1)	carbonate-glaucophane-garnet-chlorite
	2)	quartz-garnet-glaucophane-mica-epidote
	3)	glaucophane-chloritoid-stilpnomelane-muscovite-quartz
	4)	garnet-glaucophane-chlorite-carbonate-quartz

Pzqs quartzitic schists: 1) quartz-mica

Pzm greenschists: 1) actinolite-chlorite-epidote-albite-quartz
2) garnet-actinolite-quartz-chlorite (± epidote)

Pzmg metabasites: including blueschists, amphibolites, retrograded eclogites, and sodic-amphibole rocks.

blueschists:	1)	glaucophane-mica-sphene
	2)	glaucophane-jadeite-quartz-mica
	3)	crossite-garnet-mica-quartz
	4)	garnet-glaucophane
amphibolites:	1)	hornblende-garnet-zoisite
	2)	hornblende-garnet-carbonate
retro-eclogite:	1)	garnet-hornblende (relict clinopyroxene)
sodic-amphibole rocks:	1)	sodic-amphibole-carbonate

Pzps K-feldspar porphyroblast schists; porphyroblast schists: 1) feldspar-quartz-muscovite-oligoclase (± biotite-garnet)

Pzl Marbles and partially recrystallized limestones: (fossiliferous locally)

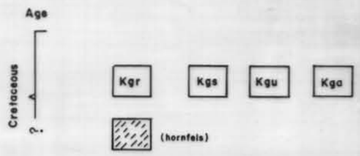
marbles:	1)	carbonate-quartz
	2)	carbonate-tremolite-quartz
	3)	carbonate-sodic amphibole

Pzpq Phyllites, calc-phyllites, micaceous and carbonaceous quartzites:

phyllites:	1) quartz-sericite-albite (chlorite)
calc-phyllites:	1) quartz-sericite-carbonate (± stilpnomelane, epidote)
micaceous quartzites:	1) quartz-sericite

Petrology by: R.B. Forbes

IGNEOUS ROCKS AND CONTACT ROCKS



Kgr Redstone pluton granite: quartz, perthitic K-feldspar, sodic plagioclase, muscovite; biotite uncommon, and altering to chlorite. Typically cataclastic; foliated in outcrop. Equivalent to Kgs. A skarn zone 10 to 25 feet thick forms a contact aureole around the pluton, the skarn rocks consist of garnet-andradite/grossularite-calcite-amphibole(actinolitic)-clinopyroxene(diopsidic)-quartz-epidote-magnetite assemblages, as well as quartz-muscovite (often in symplectitic intergrowth)-magnetite-hematite associations.

Kgs Shishakshinovik pluton granite: quartz, perthitic K-feldspar, sodic plagioclase, muscovite, and biotite (altering to chlorite). Aplitic phases common near borders, possibly indicating chilled zones. Micrographic texture is not uncommon. Small fingers near borders are highly perthitic. Inclusions of country rock are common near borders, and lit-par-lit contact zones are found in some localities. Typically cataclastic, and foliated in outcrop. Roof pendants indicate that the uppermost portion of the intrusion is presently exposed.

hornfels Hornfels contact zone around Ulaneak stock and Shishakshinovik pluton. Biotite grade hornblende hornfels, with magnetite-hematite-sulphide assemblages present. Retro-grade metamorphism is common.

Kgu Ulaneak stock granite: cf. Kgs. Probably a limb of Kgs. Small fingers are highly perthitic.

Kga granite and granitic rocks: small tabulate bodies of granite and granitic rocks. Biotite-muscovite bearing perthite-sodic plagioclase granite in one location. Highly foliated and cataclastic.

Petrology by: T.C. Mowatt

TABLE 1. POTASSIUM - ARGON AGE DETERMINATIONS

PART 1. Data from: D. L. Turner (University of Alaska - Geophysical Institute)

Map No.	Sample No.	Rock Type	Mineral dated	K_2O (wt. pct.)	Sample Weight (grams)	$^{40}Ar_{rad}$ (moles/gm) $\times 10^{-11}$	$\frac{^{40}Ar_{rad}}{^{39}Ar_K} \times 10^{-2}$	$\frac{^{40}Ar_{rad}}{^{40}Ar_{total}}$	Age ± 1σ m.y.
1	72F10AM311 (72161)	actinolite schist	actinolite	0.029 0.030 0.028 0.026 0.031	0.9988	1.477	1.828	0.174	289.1± 46.2
	72F10AM311 (72/550) replicate		actinolite	0.042 0.034 0.031	1.0159	1.461	1.814	0.149	287.1± 45.9
				$\bar{x}$ = 0.032					$\bar{x}$ = 288.1± 46.1
2	A-1 (72146)	glaucophane-paragonite schist	paragonite	0.430 0.435	0.5177	15.84	1.465	0.329	234.4± 7.0
2	A-2 (72162)	jadeite-glaucophane-paragonite schist	paragonite	0.550 0.555	1.9661	18.37	1.322	0.481	213.4± 6.4
2	A-3 (72163)	jadeite-glaucophane-paragonite schist	paragonite	0.641 0.648	0.7656	21.75	1.344	0.787	216.8± 6.5
3	72021I (73011)	carbonate-bearing biotite-quartz schist	biotite	0.167 0.169	0.3073	134.2	0.5785	0.814	96.4± 2.9
				$\bar{x}$ = 0.165					

Constants used in age calculations:

$\lambda_k = 0.585 \times 10^{-10}$/yr
$\lambda_\beta = 4.72 \times 10^{-10}$/yr
$K^{40}/K_{total} = 1.19 \times 10^{-4}$ mole/mole

The actinolite and paragonite K-Ar data listed above plot on a straight line on a $^{40}Ar_{rad}/^{40}K$ isochron diagram and yield an isochron age of 213 m.y., indicating that the latest thermal metamorphic event affecting these rocks culminated in Triassic time.

PART 2. Data from: Patton, W.W., Miller, Thomas P., and Tailleur, I.L., 1968, Regional Geologic Map of the Shungnak and Southern Part of the Amber River Quadrangles, Alaska, U.S. Geological Survey map I-554

Map No.	Field No.	Latitude and Longitude	Mineral	K_2O percent	Ar^{40}_{rad} (moles/gm)	$\frac{Ar^{40}_{rad}}{Ar^{40}_{total}}$	Apparent Age m.y.
see note	65APp44	66°59'N, 156°42'W	hornblende	0.743 0.758 0.751	1.590×10^{-10}	0.93	121 ± 5.8

Note: from granite unit in Cosmos Hills, just south of map boundary on Kanoluktuk River

Argon analysis and age calculation: H. A. Lanphere, J. N. Leutscher and E. H. McKee
Potassium analysis: L. B. Schlocker and H. C. Whitehead

K^{40} decay constants: $\lambda_k = 0.585 \times 10^{-10}$ year^{-1}; $\lambda_\beta = 4.72 \times 10^{-10}$ year^{-1};
Abundance ratio: $K^{40}/K = 1.19 \times 10^{-4}$ atom percent

PART 3. Data from: unpublished U. S. Geological Survey work

Map No.	Field No.	Latitude and Longitude	Mineral	K_2O percent	Ar^{40}_{rad} (moles/gm)	$\frac{Ar^{40}_{rad}}{Ar^{40}_{total}}$	Apparent Age m.y.
4	66AT+134	67°04'N, 156°20'W	muscovite	10.52 10.53 avg. 10.52	15.76×10^{-10}	0.19	66.8 ± 2.2

Sample collected by: Norman Lutz, Bear Creek Mining Co., 1965

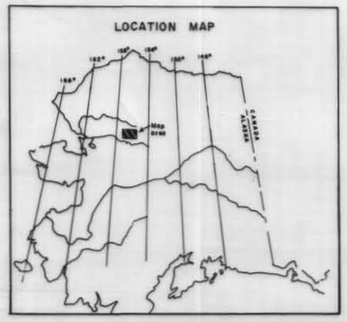
Unit: Shishakshinovik pluton (Kss)

Potassium analyses: L. B. Schlocker and H. C. Whitehead
Argon analyses and age calculation: H. A. Lanphere and E. H. McKee

K^{40} decay constants: $\lambda_k = 0.585 \times 10^{-10}$ year^{-1}
$\lambda_\beta = 4.72 \times 10^{-10}$ year^{-1}
Abundance ratio: $K^{40}/K = 1.19 \times 10^{-4}$ atom percent

⚠ Location of radiometric date

LOCATION MAP



SYMBOLS

- Contact: long dashes where approximate, short dashes where inferred, dotted where concealed.
- Fault: long dashes where approximate, short dashes where inferred, dotted where concealed. U: upthrown side D: downthrown side.
- Thrust fault: dashes where approximate, queried where inferred, dotted where concealed, sawtooth on upper plate.
- Anticline: dashes where approximate, short dashes where where inferred, dotted where concealed. Arrow shows plunge
- Syncline: dashes where approximate, short dashes where inferred, dotted where concealed. Arrow shows plunge.
- Overturned anticline
- Overturned syncline
- Strike and dip of beds
- Strike and dip of beds from distant view or from airphoto.
- Strike of vertical beds
- Horizontal beds
- Location of radiometric date

REFERENCES

1) Brosge, W.P., Reiser, H.N., & Tailleur, I.L., 1972, unpublished geologic map of Ambler River quadrangle, Alaska; U.S. Geological Survey, unpublished data

2) Fritts, C.E., 1970, Geology and geochemistry of the Cosmos Hills, Ambler River and Shungnak quadrangles, Alaska; Alaska Division of Geological Survey Report No. 39

3) Fritts, C.E., Eakins, G.R., & Garland, R.E., 1971, Geology and Geochemistry near Walker Lake, Survey Pass quadrangle, Alaska; Alaska Division of Geological Survey, Annual Report 1971

4) Patton, W.W. Jr., Miller, T.P., & Tailleur, I.L., 1968, Regional Geologic map of the Shungnak and southern part of the Ambler River quadrangles, Alaska; U.S. Geological Survey, Misc. Geol. Inv. Map I-554

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Special Note: The mapping project in 1972 was started under the direction of C.E. "Jim" Fritts. Fritts was killed in an accident early in the field season. The authors wish to acknowledge the use of his notes, field maps, and unpublished data from adjacent areas.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
OPEN FILE REPORT NO. 37

Preliminary Geologic Map of Southeastern Ambler River and Part of Survey Pass Quadrangles, Alaska

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Assisted by: J.T. Larsen, W.R. Roberts and J.M. Zdepski
Petrology by: R.B. Forbes[3] and T.C. Mowatt[1]
Geochronology by: D.L. Turner[3]

Scale: 1=63,360

Contour Interval: 200 Ft.
Datum: Mean Sea Level

1973

This map is preliminary and has not been edited or reviewed for conformity with Alaska Geological Survey standards.

SHEET 2 of 2

1) Alaska Geological Survey
2) U.S. Geological Survey
3) University of Alaska - Geophysical Institute