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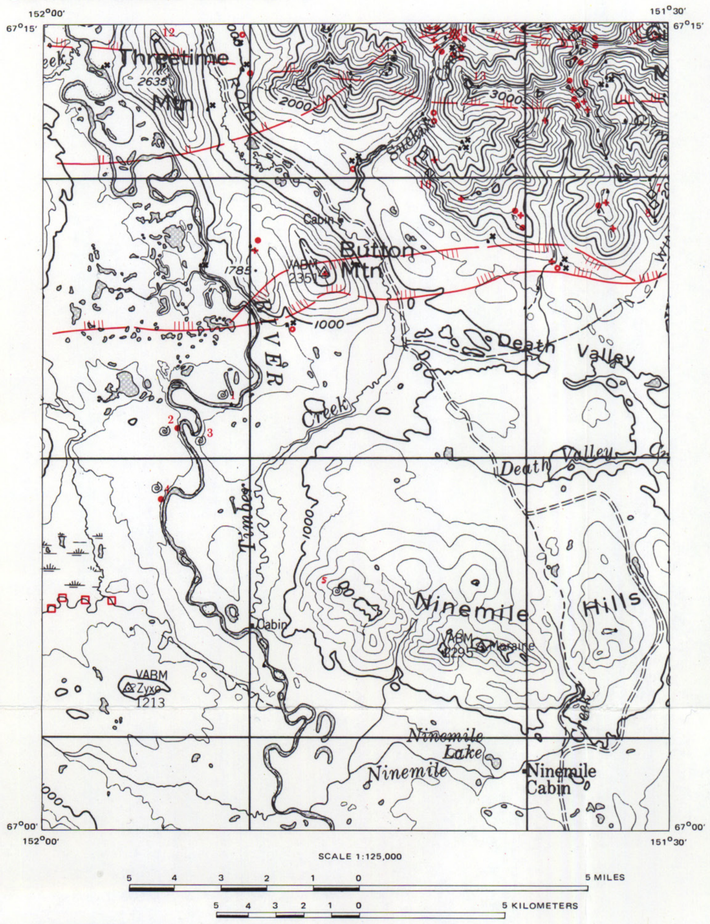

EXPLANATION

- Traverse
- Station
- Gravity station
- 2 Fossil locality—Numbers correspond to description in table 1
- Rock-sample locality
- Rock-sample with thin section
- 9 Rock-sample with major-oxide geochemistry and thin section. Numbers correspond to description in table 2
- 14 Rock-sample with thin section, major-oxide geochemistry, and radiometric dating—Number corresponds to description in tables 3 and 4 and figure 4
- Rock-sample for assay*
- Pan-concentrate sample for assay*
- Stream-sediment sample for assay*
- Tremolite in calc-silicate hornfels inside barbs
- Garnet in quartz schist and greenschist inside barbs
- Biotite in quartz schist inside barbs
- Actinolite in greenschist inside barbs
- Muscovite, chlorite, and albite in quartz schist, and clinozoisite, biotite, epidote, chlorite, and albite in greenschist inside barbs

*See Dillon, Cathrall, and Moorman, 1981; and Dillon, Moorman, and Lueck, 1981.

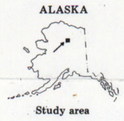

Figure 1. Map of Wiseman A-4 Quadrangle, southcentral Brooks Range, northern Alaska, showing mineral zones, geologic traverses and stations, and fossil and rock-sample localities. Base from U.S. Geological Survey Wiseman Quadrangle, Alaska, 1977.

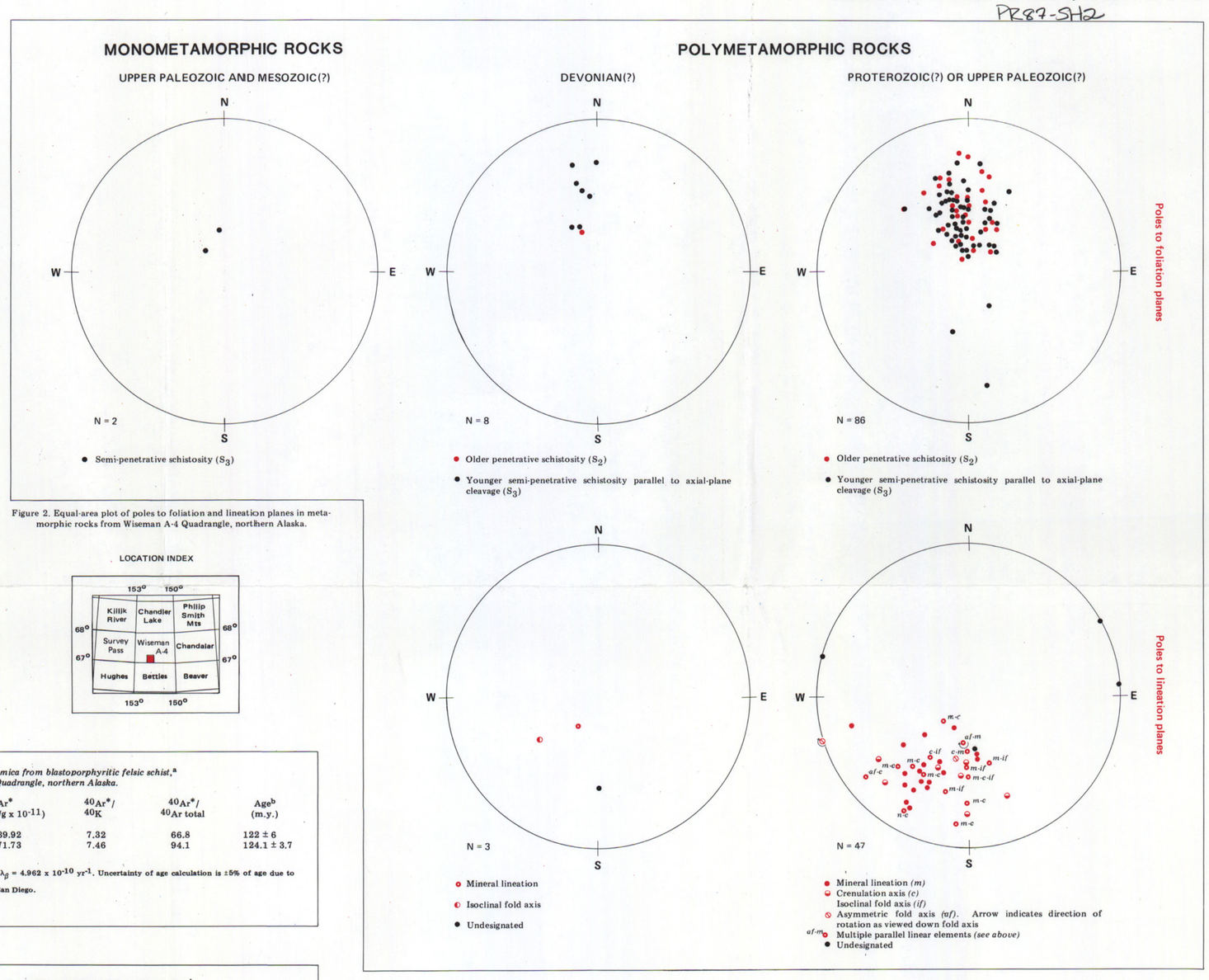

Figure 2. Equal-area plot of poles to foliation and lineation planes in metamorphic rocks from Wiseman A-4 Quadrangle, northern Alaska.

LOCATION INDEX

Table 1. *Upper Cretaceous plant and invertebrate fossils from Wiseman A-4 Quadrangle, northern Alaska (identified by C.J. Smiley, University of Idaho, Moscow, 1979).*

Map[a] no.	Location of collection site	Fossil	Age and correlation
1	67°07'52"; 151°50'54"	Dicotyledon leaf fragments Coalified stem fragments Freshwater clam *Paracrednaria*?	Plant fossils are similar to Cretaceous 'Shaktolik' floras along the Yukon River (Hollick and Martin, 1930, p. 159); the closest correlation is with upper Albian floras of the Nanushuk Group north of the Brooks Range.
2	67°07'26"; 151°53'03'	Sand casts of stems	*Unio* sp. resembles freshwater clams in upper part of Nanushuk Group.
3	67°07'31"; 151°53'40"	Coalified wood chips Dicotyledon leaf fragments Conifer shoots *Sequoia reichenbachi*, *Cephalotaxopsis microphylla laxa*	
4	67°06'13"; 151°54'10"	*Populites sp.*, *Credneria inordinata* Conifer shoots *Sequoia reichenbachi*, *Cephalotaxopsis heterophylla*, *C. microphylla laxa*, *Conites* sp. Freshwater clam *Unio sp.*	
5	67°04'28"; 151°45'30"	Dicotyledon leaf fragments	

[a]See figure 1.

Table 3. *K-Ar data for white mica from blastoporphyritic felsic schist,*[a] *Wiseman A-4 Quadrangle, northern Alaska.*

Sample	Sample wt (g)	K_2O (wt%)	$^{40}Ar^*$ (moles/g x 10^{-11})	$^{40}Ar^*/^{40}K$	$^{40}Ar^*/^{40}Ar$ total	Age[b] (m.y.)
1[c]	0.2167	6.4	139.92	7.32	66.8	122 ± 6
2[d]	0.1460	9.3	171.73	7.46	94.1	124.1 ± 3.7

[a]Sample 14, figure 1.
[b]Constants used in age calculations: $\lambda_{\in} = 0.581 \times 10^{-10}\ yr^{-1}$; $\lambda_{\beta} = 4.962 \times 10^{-10}\ yr^{-1}$. Uncertainty of age calculation is ±5% of age due to atmospheric Ar.
[c]Analysis by D.B. Krummenacher, California State University - San Diego.
[d]Analysis by J.D. Blum, DGGS.
*Radiogenic isotope.

Table 4. *U-Pb and Pb-Pb data for zircons*[a] *from blastoporphyritic felsic schist,*[b] *Wiseman A-4 Quadrangle, northern Alaska.*

Weight (mg)	Concentration (ppm) ^{238}U	$^{206}Pb^*$	$^{207}Pb^*$	Isotopic ratio[c] $^{206}Pb/^{204}Pb$	$^{207}Pb/^{206}Pb$	$^{206}Pb^*/^{238}U$	$^{207}Pb^*/^{235}U$	Age (m.y.)[d] $^{206}Pb^*/^{238}U$	$^{207}Pb^*/^{235}U$	$^{207}Pb^*/^{206}Pb^*$
9.8	1299	35.42	1.866	842	0.06957	0.03151	0.2268	200	208	295

[a]Transparent, light- to purple-brown euhedral crystals that have complete prism, one termination, and no large inclusions.
[b]Sample 14, figure 1.
[c]Isotopic ratios corrected for mass fractionation of 0.1 ± 0.03 percent per mass unit on basis of replicate analyses of U.S. National Bureau of Standards Pb standards SRM 981-983. Ratios are not corrected for contamination from $^{206}Pb/^{235}U$ mixed spike. Isotopic composition of Pb and U in mixed spike is $^{208}Pb/^{206}Pb = 3.765$; $^{207}Pb/^{206}Pb = 0.8665$; $^{205}Pb/^{206}Pb = 649$; $^{204}Pb/^{208}Pb = 0.089$; $^{235}U/^{238}U = 4200$.
[d]Constants used in age calculation: $\lambda^{238}U = 1.5513 \times 10^{-10}$; $\lambda^{235}U = 9.848 \times 10^{-10}$; $^{238}U/^{235}U = 137.88$. Uncertainty of age calculation is <2 percent of age; actual age is > Pb-Pb age (see fig. 4).
*Radiogenic Pb corrected for common Pb using the isotopic ratios $^{204}Pb/^{206}Pb = 18.8$ and $^{207}Pb/^{204}Pb = 15.65$.

Table 2. *Major-oxide analyses and CIPW norms of metamorphic rocks in the Wiseman A-4 Quadrangle, northern Alaska.*

Map no.[a] Rock type	6 Tremolite-calcite calc-silicate hornfels[b]	7 Calcareous chlorite greenschist[c]	8 Calcareous felsic metatuff(?)[c]	9 Calcareous albite greenschist[c]	10 Calcareous chlorite greenschist[c]	11 Albite-chlorite greenschist[c]	12 Calcareous albite greenschist[c]	13 Muscovite quartz schist[c]	14 Blasto-porphyritic felsic schist[c]
Major-oxide analyses (wt %)									
SiO_2	40.90	47.03	69.55	45.30	46.80	41.83	47.37	80.62	75.23
Al_2O_3	11.00	13.08	11.13	16.43	16.56	15.64	17.01	10.84	11.69
Fe_2O_3	3.64	0.64	1.21	2.37	1.95	0.98	1.70	1.63	0.61
FeO	1.08	11.00	5.49	8.91	6.96	9.68	8.91	0.53	1.67
MnO	0.07	0.19	0.04	0.20	0.15	0.18	0.17	0.01	0.03
MgO	5.31	6.08	3.54	7.02	6.12	7.96	7.14	0.29	0.15
CaO	22.00	8.05	1.90	6.92	8.40	9.88	8.93	0.01	0.11
Na_2O	0.91	3.03	3.01	4.07	1.37	3.34	1.60	0.90	0.95
K_2O	1.74	0.00	0.43	0.00	2.40	0.00	0.11	3.39	7.04
TiO_2	0.47	2.69	0.92	2.13	0.63	1.29	2.11	0.43	0.47
P_2O_5	0.10	0.27	0.21	0.22	0.09	0.12	0.20	0.04	0.10
H_2O+	1.25	--	--	--	--	--	--	1.55	0.49
H_2O-	0.09	--	--	--	--	--	--	0.13	--
CO_2	12.40	--	--	--	--	--	--	0.09	--
LOI[d]	--	9.03	3.09	8.11	9.96	10.57	5.82	--	0.43
Total	100.96	101.09	100.52	101.68	101.39	101.47	101.07	100.46	98.97
Norms (%)									
Quartz	--	0.23	38.16	0.00	0.01	0.00	3.94	61.98	41.75
Orthoclase	--	0.00	2.54	0.00	14.18	0.00	0.65	20.03	41.70
Albite	--	25.60	25.47	34.44	11.59	16.05	13.54	7.62	8.04
Anorthite	--	22.09	8.05	26.56	31.95	27.68	38.91	0.00	0.00
Diopside	--	13.32	0.00	5.16	7.47	16.85	3.34	0.00	0.00
Hypersthene	--	24.12	16.45	1.13	22.00	0.00	27.94	0.72	2.22
Olivine	--	0.00	0.00	18.29	0.00	19.56	0.00	0.00	0.00
Magnetite	--	0.93	1.75	3.44	2.83	1.42	2.46	0.50	0.88
Illmenite	--	5.11	1.75	4.05	1.20	2.45	4.01	0.82	0.89
Apatite	--	0.63	0.49	0.51	0.21	0.00	0.46	0.06	0.65
Corundum	--	0.00	4.32	0.00	0.00	0.00	0.00	5.69	2.51
Nepheline	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hematite	--	0.00	0.00	0.00	0.00	0.00	0.00	1.29	0.00
Total		92.07	98.98	93.58	91.44	90.63	95.25	98.71	98.64

[a]See figure 1.
[b]Oxides determined by atomic-absorption spectrophotometry. Analyst - N.C. Veach, DGGS Minerals Laboratory.
[c]Oxides determined by X-ray fluorescence spectrophotometry. Analyst - N.C. Veach, DGGS Minerals Laboratory.
[d]Loss on ignition.
-- Not determined.

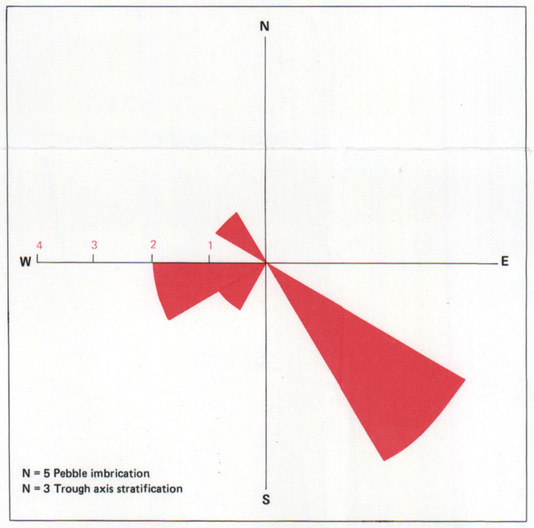

Figure 3. Rose diagram showing paleocurrent directions measured from Cretaceous conglomerate and sandstone from Wiseman A-4 Quadrangle, northern Alaska, after correction for folding.

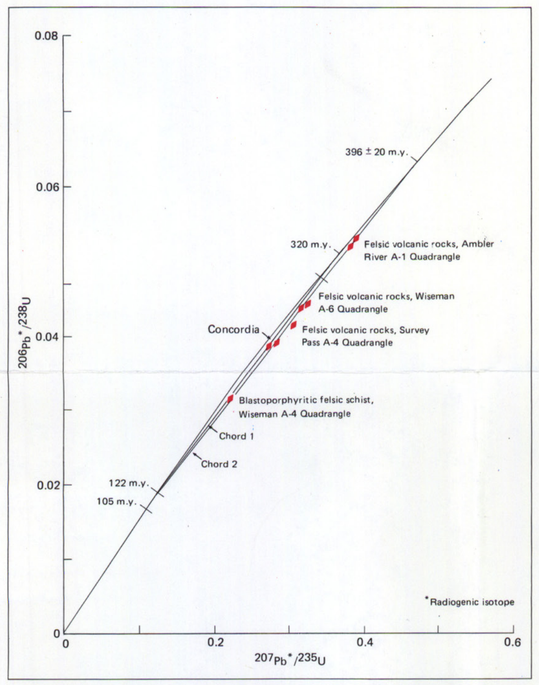

Figure 4. Concordia diagram of U-Pb analyses of blastoporphyritic felsic schist (sample 14, fig. 1) from the Wiseman A-4 Quadrangle, northern Alaska (table 4) and of eight felsic igneous rocks from Wiseman, Survey Pass, and Ambler River Quadrangles. northern Alaska (Dillon, Pessel, Chen, and Veach, 1979, 1980); Dillon, Tilton, Decker, and Kelley, 1987). Chord 1 shows that zircons from sample 14 crystallized 320 m.y. ago and lost lead during a metamorphic event about 122 m.y. ago (the K-Ar age of muscovite from sample 14). Chord 2, based on more data shows the preferred interpretation that zircons crystallized about 396 ± 20 m.y. ago and lost lead during a metamorphic event ending about 122 ± 25 m.y. ago.

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SUPPLEMENTAL DATA FOR BEDROCK GEOLOGIC MAP OF THE WISEMAN A-4 QUADRANGLE, SOUTHCENTRAL BROOKS RANGE, ALASKA

by

J.T. Dillon, G.H. Pessel, Larry Lueck, and W.B. Hamilton

1987