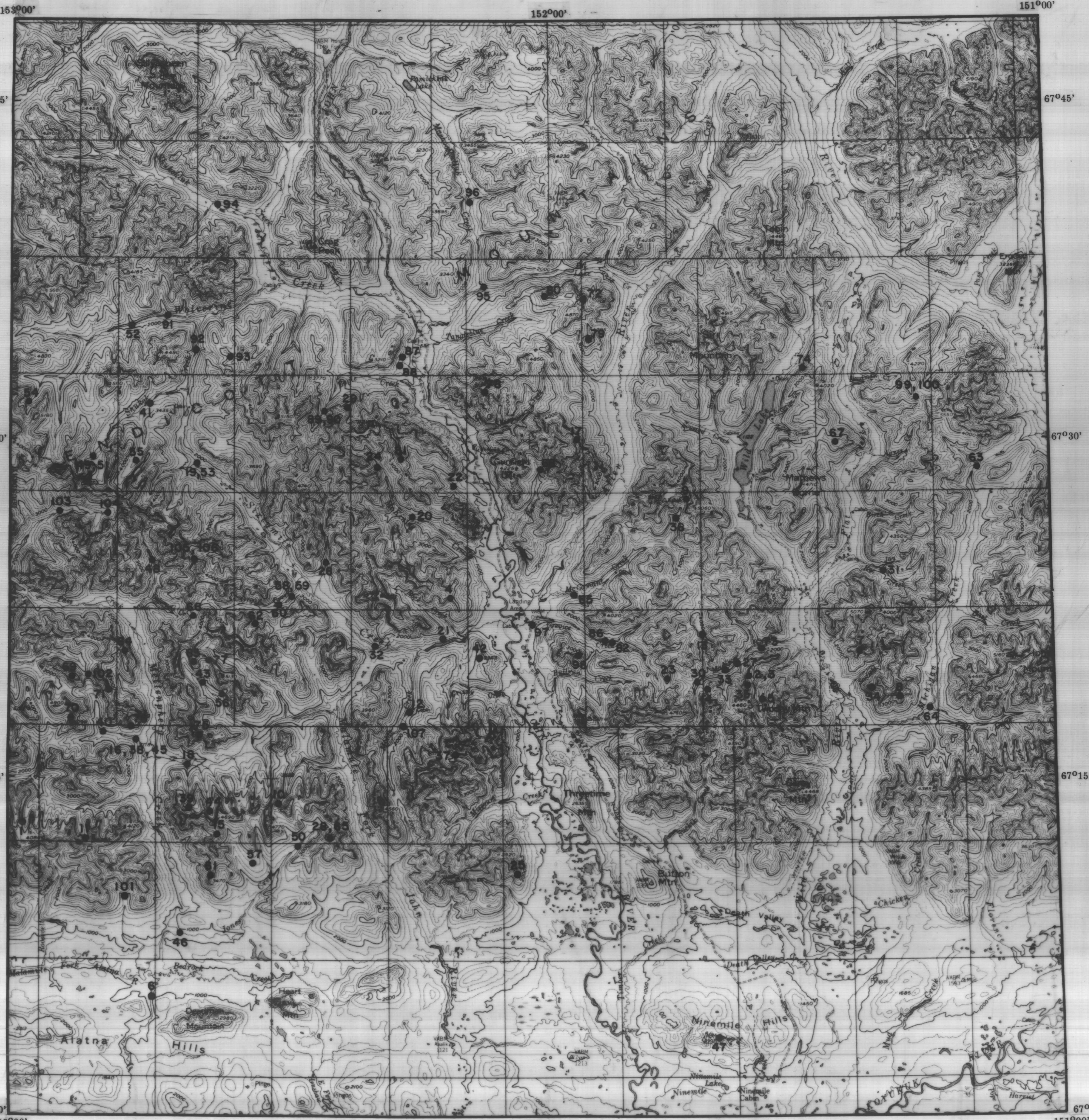
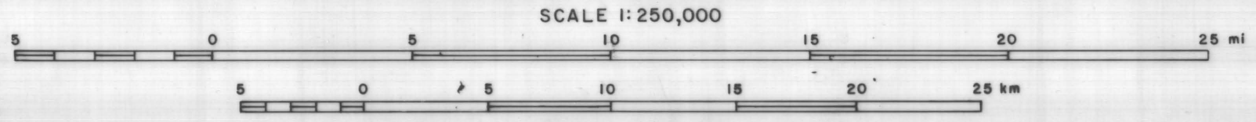
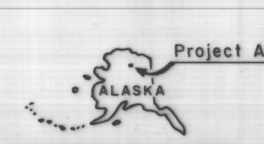


Base from U.S. Geological Survey, 1975, Wiseman Quadrangle, Alaska.

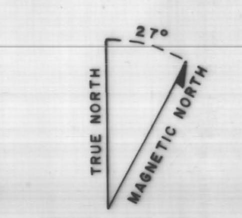
Samples collected by J.T. Dillon, S.W. Hackett, G.H. Pessel, J.R. Riehle, M.W. Henning, Donald Wells, and K.P. Corbett.

SCALE 1:250,000





QUADRANGLE LOCATION



APPROXIMATE MEAN DECLINATION, 1959

This is a preliminary publication of the Alaska Division of Geological and Geophysical Surveys and as such has not received final editing and review. The author will appreciate candid comments on the accuracy of the data, and welcome suggestions that will improve the report.

EXPLANATION

During the 1977, 1978, and 1979 summer field seasons, the Alaska Division of Geological and Geophysical Surveys (DGGS) conducted a reconnaissance geophysical rock-sampling program in the southwest corner of the Wiseman Quadrangle, Brooks Range, Alaska. Physical rock-property values obtained from these samples can be used in interpreting geophysical data from the southern Brooks Range. The physical rock-property data may be useful even though such properties are commonly subject to wide fluctuations over short distances in some localities of the quadrangle.

One hundred nine rock samples collected from the southwestern Wiseman Quadrangle (long. 151°-153° N., lat. 67°-67°45' W.) were analyzed by Elliot Geophysical Company for volume-magnetic susceptibility, bulk-rock density, and resistivity values using conventional laboratory techniques. Semiquantitative analyses were run on 60 oriented samples for natural remanent magnetization (NRM) and total intensity of magnetization.

Map and field numbers, a brief field description, magnetization, the Koenigsberger ratio, volume magnetic susceptibility, bulk-rock density, and resistivity values of each rock sample are shown in table 1. Volume-susceptibility measurements (μ) were conducted with a magnetic-susceptibility bridge instrument operating at a frequency of 400 Hz (μ values $\pm$ 20 x 10^{-6} cgs units*). Bulk-rock-density values (ρ) were determined by the bouyancy method (ρ values $\pm$ 0.01 grams per cm^3). Resistivity determinations ($1/\sigma$) were made in the time (T=2.0 s, T_D = 450 ms, and Tw = 650 ms) and frequency (0.1 and 1.0 Hz) domains. Resistivity (ohmeter) is the inverse of rock conductivity (σ).

The NRM of cores from 60 oriented samples was determined with a static fluxgate magnetometer. The directions of NRM for selected rock types are plotted on an equal-area stereographic projection (fig. 1). The direction of the NRM vector is defined by declination referenced to magnetic north at the sample site; inclination is referenced to the horizontal (positive above, negative below) (fig. 2). No AC demagnetization of individual rock samples was performed. The total intensity and direction of magnetization can be determined from volume-susceptibility values (μ) and the NRM vector by the following relationship: $\overline{I} = \overline{J} + k\overline{F}$, where $\overline{I}$ is the total intensity of magnetization in gammas, $\overline{J}$ is the natural remanent magnetization in gammas, k is the volume susceptibility in cgs units* and $\overline{F}$ is the earth's total magnetic field in gammas†. The Koenigsberger ratio (Q) (table 1) is a direct measurement of the ratio of remanent magnetization to induced magnetization because it is related to NRM by the equation $Q = \overline{J}(k\overline{F})^{-1}$. If Q is greater than one--as it is for most Wiseman Quadrangle samples---the NRM vector is the predominant contribution to the total intensity of magnetization. Wide variations in paleomagnetic values substantiate the need for further detailed magnetic-property studies of the rock samples. Magnetic-susceptibility determinations would be more diagnostic if tested and quantified with thermal and alternating-field demagnetization equipment.

*cgs units convert to SI units by multiplying by pi (π).
†10^{-5} gammas = 1 emu/cc (gauss).

Table 1. ROCK DESCRIPTION AND PHYSICAL PROPERTY LABORATORY DETERMINATIONS*

Map number	Field number	Field description	Core orientation: Magnetic azimuth (degrees)	Core orientation: Inclination (degrees)	NRM: Magnitude (gammas)	NRM: Koenigsberger ratio for F = 57000 gammas	NRM: Declination (degrees)	NRM: Inclination (degrees)	(μ) Volume magnetic susceptibility (10^{-6} cgs units)	(ρ) Bulk density (grams/cc)	$1/\sigma$ Resistivity (ohmmeters)
1	77 DN 137	Ferruginous muscovite-quartz metagraywacke	175	26	9.61E+01	8.03	260	-7	210	2.90	6000
2	77 PE 30A	Muscovite-quartz graphitic schist	343	29	2.98E-02	3.49	339	-24	<20	2.80	33000
3	77 PE 30B	Calc-chlorite-albite greenschist	10	18	1.11E-01	9.74	345	82	<20	2.82	2500
4	77 DN 54	Muscovite-quartz phyllitic schist	210	68	9.39E-03	8.24	86	24	<20	2.71	13000
5	77 DN 32	Graphite-muscovite-albite schist	326	24	1.19E+00	1.04	158	62	<20	2.80	31000
6	77 DN 136	Metagabbro	63	52	1.54E+00	3.86	189	-2	70	2.88	2500
7	77 PE 64	Magnetite-chlorite felsic schist	160	0	3.78E+00	4.13	244	-60	1610	2.80	19000
8	77 Ri 3	Graphitic mica-quartz schist	270	65	2.26E-01	1.98	82	76	<20	2.84	7800
9	77 DN 46	Calc-quartz-chlorite schist	20	46	8.00E+01	1.56	65	+16	90	2.90	6300
10	77 DN 134	Muscovite quartzofeldspathic schist	228	63	4.09E-02	3.59	217	64	<20	2.83	37000
11	77 DN 120	Pyritic mica-quartz metagraywacke	247	28	5.63E-02	4.94	235	64	<20	2.81	33000
12	77 DN 141	Mica-albite-quartz schist	355	45	2.08E+00	1.83	146	63	<20	2.83	19000
13	77 Ri 26	Chlorite-mica quartzite	320	78	6.17E-02	5.41	223	65	<20	2.64	45000
14	77 SWH 37	Graphitic muscovite-albite-quartz schist	0	56	5.33E+00	4.68	101	45	<20	2.70	9800
15	77 DN 67	Muscovite-quartz schist	335	45	1.09E-01	9.56	335	39	<20	2.80	18000
16	77 SWH 35	Micaceous sandy marble	175	33	8.01E-02	1.76	313	50	60	2.86	5700
17	77 DN 50	Gray marble	345	85	1.17E-02	1.03	151	-17	<20	2.73	45000
18	77 SWH 34	Ferruginous graphitic muscovite-quartz schist	13	43	1.37E-02	1.20	183	51	<20	2.71	40000
19	77 SWH 39	Ferruginous calc-quartzite	150	81	1.78E+01	1.35	152	19	230	2.88	4700
20	77 DN 99	Gray marble	180	13	2.59E-02	2.27	335	69	<20	2.69	17000
21	77 DN 153	Magnetite-actinolite-chlorite greenschist	265	38	1.29E+01	1.09	293	-30	2240	2.80	6800
22	77 Ri 69	Calcite-quartz metaconglomerate schist	210	66	6.37E-02	5.59	37	-5	<20	2.71	7600
23	77 Ri 58A	Magnetite-garnet-chlorite-albite greenschist	61	40	5.93E+00	2.48	303	71	4190	2.89	62000
24	77 DN 97	Gray marble	185	45	2.37E-02	2.08	299	35	<20	2.62	9000
25	77 DN 166	Graphitic muscovite-quartz schist	335	29	5.64E-02	4.95	56	42	<20	2.69	85000
26	77 SWH 21	Micaceous calc-quartz schist	145	19	2.37E-02	2.08	349	43	<20	2.85	2700
27	77 DN 86	Graphitic muscovite-quartz calc-schist	330	64	4.16E-02	3.65	269	1	<20	2.79	3100
28	77 Ri 45A	Graphitic calc-muscovite schist	87	81	2.45E-01	2.15	254	38	<20	2.76	14000
29	77 Ri 37	Graphitic muscovite-quartz schist	156	53	4.16E-01	3.21	304	23	140	2.71	26000
30	77 DN 83	Muscovite-quartz-chlorite-albite greenschist	162	13	3.60E-02	3.16	171	-64	<20	2.87	12000
31	77 Ri 66	Ferruginous quartz-calcite schist	222	70	1.38E+00	1.31	50	45	<20	2.68	68000
32	77 DN 102C	Quartz monzonite orthogneiss	70	85	2.43E-02	2.13	217	56	<30	2.68	6800
33	77 DN 29	Gray marble	130	36	1.36E-02	1.19	276	58	<30	2.86	56000
34	77 PE 77	Ferruginous muscovite-quartz schist	343	13	4.30E-02	3.77	135	29	<20	2.84	22000
35	77 PE 28	Sericite-chlorite-quartz schist	148	5	4.34E-02	3.72	349	75	<20	2.74	5500
36	77 DN 89	Pyritic muscovite-quartz marble	15	58	5.83E+00	5.11	3	33	<20	2.74	10000
37	77 DN 145	Hematitic graphite-muscovite-quartz-albite schist	310	64	5.61E-02	4.93	185	45	<20	2.69	17000
38	77 SWH 35B	Micaceous quartzo-feldspathic schist	⊛						<20	2.83	8300
39	77 SWH 33B	Garnet-quartz-actinolite greenschist	⊛						80	2.82	110000
40	77 SWH 36	Sericite-muscovite quartzo-feldspathic schist	⊛						<30	2.81	4400
41	77 SWH 32B	Magnetite-chlorite-albite greenschist	⊛						5520	2.89	71000
42	77 SWH 20	Ferruginous calc-muscovite-quartz schist	⊛						<20	2.62	12000
43	77 SWH 32	Magnetite-chlorite-albite greenschist	⊛						5830	2.90	71000
44	77 SWH 32A	Graphitic muscovite-quartz schist	⊛						<20	2.72	13000
45	77 SWH 35BB	Micaceous feldspathic quartzite	⊛						<20	2.83	4900
46	77 SWH 43	Pyritic sandy marble	⊛						<20	2.82	18000
47	77 SWH 40	Pebbly, mafic, quartz conglomerate	⊛						△	2.73	26000
48	77 SWH 37	Sandy marble	⊛						<20	2.77	7400
49	77 SWH 30D	Graphitic muscovite feldspathic quartzite	⊛						30	2.63	7700
50	77 SWH 42	Pyritic calc-muscovite-quartz-albite schist	⊛						△	2.58	△
51	77 SWH 30	Ferruginous feldspathic metaquartzite	⊛						<20	2.67	14000
52	77 SWH 30X	Muscovite-quartz schist	⊛						<20	2.66	13000
53	77 SWH 29B	Sericite-muscovite quartzite	⊛						<20	2.59	2700
54	77 SWH 30DY	Muscovite feldspathic metaquartzite	⊛						<20	2.66	6500
55	77 SWH 31A	Pyritic calc-muscovite-quartz schist	⊛						<20	2.70	2500
56	77 SWH 31B	Pebbly, micaceous quartz metaconglomerate	⊛						<30	2.68	7100
57	77 SWH 22	Micaceous quartz schist	⊛						<20	2.71	20000
58	77 SWH 23A	Gray sandy marble	⊛						<30	2.69	27000
59	77 SWH 23B	Gray sandy marble	⊛						△	2.64	7300
60	77 SWH 24	Pyritic muscovite-feldspathic schist	⊛						<20	2.66	3300
61	77 Ri 50	Knotty graphitic muscovite-quartz schist	⊛						<20	2.76	53000
62	77 SWH 24X	Pyritic muscovite-quartz schist	⊛						<20	2.76	16000
63	77 SWH 25	Talc-chlorite-quartz schist	⊛						<20	2.79	9200
64	77 SWH 26	Pyritic chlorite-muscovite-quartz schist	⊛						110	2.72	4500
65	77 Ri 45B	Graphitic chlorite-quartz-muscovite schist	⊛						△	2.80	△
66	77 SWH 25X	Siderite micaceous quartz schist	⊛						<20	2.72	8500
67	78 PE 110	Calcareous quartz pebble conglomerate	172	33	1.0E-02	1.0	123	-24	17	2.71	1400
68	78 DN 56	Argillaceous marble breccia	70	65	0 (approx.)	0	124	-62	< 1	2.74	56500
69	78 WS 49	Calcareous chloritic quartz schist	210	90	0 (approx.)	0	76	23	15	2.72	2860
70	78 WS 55	Dolomitic marble breccia	60	-25	2.0E-02	8.8	338	-10	4	2.85	28200
71	78 DN 40	Chlorite-muscovite-quartz schist			2.84E+02		209	68	40	2.81	9770
72	78 DN 68	Hematitic micaceous quartz calc-schist	100	67	6.0E-02	5.0	348	35	21	2.85	8370
73	78 DN 110	Schistose quartz-muscovite-marble	340	50	1.0E-02	2.9	110	-52	6	2.74	7780
74	78 DN 99	Calcareous quartzite grit and conglomerate	350	85	1.0E-02	36945.3	237	73	17	2.72	11900
75	78 DN 38	Micaceous albite greenschist			3.58E+04		320	45	80	2.82	5230
76	78 DN 44	Dolomitic marble	50	40	0 (approx.)	0	310	10	< 1	2.72	79600
77	78 DN 31	Graphitic micaceous quartz schist	330	75	9.0E-02	0.2	249	-51	10	2.75	11100
78	78 PE 77	Calcareous quartz pebble conglomerate	197	50	2.0E-02	2.9	296	41	12	2.71	19200
79	78 DN 65	Graphitic micaceous quartz schist	206	59	1.29E+00	1.6	246	47	14	2.73	1480
80	78 DN 76	Calcareous quartz metasandstone	100	70	0 (approx.)	0	340	26	3	2.65	21600
81	78 HG 161	Magnetite micaceous greenstone			1.38E+01	1.0	27	35	250	2.86	14600
82	78 DN 108	Garnet-chlorite-quartz schist	139	75	0 (approx.)	0	141	45	11	2.79	5410
83	78 DN 29	Quartz-calcite micaceous schist	0	45	3.7E-01	4.7	100	48	138	2.80	2250
84	78 DN 26	Magnetite-epidote micaceous greenstone			8.52E+01		310	-5	4900	2.95	10700
85	78 DN 47	Graphitic micaceous quartz schist	⊛						650	2.78	
86	79 SWH 37B	Pyritic greenstone	84	78	5.3E-01	0.16	311	37	65	2.92	6500
87	79 DN 251	Weathered metagabbro	⊛						44	2.95	
88	79 DN 252	Serpentinized metaperidotite	⊛						106	2.83	
89	79 SWH 30	Dirty gray quartz dolomite	⊛						5.2	2.68	4400
90	79 SWH 31	Ferruginous gray quartz dolomite	⊛						8.4	2.72	3300
91	79 SWH 32	Graphitic micaceous schist	⊛						1.4	2.63	10000
92	79 SWH 33	Graphitic micaceous schist	⊛						11	2.57	400
93	79 SWH 34A	Olivine basalt	⊛						1100	3.07	5600
91	79 SWH 35	Argillaceous dolomite	⊛						7.2	2.51	480
95	79 SWH 36	Pyritic greenstone	⊛						69	3.11	5200
96	79 SWH 36B	Pyritic quartz greenstone							70	2.85	3400
97	79 SWH 38	Magnetite greenstone							7700	2.95	4300
98	79 SWH 39B	Gray sandy dolomite							1.0	2.63	2300
99	79 SWH 50	Dark-green graphitic phyllite							8.3	2.61	8300
100	79 SWH 51	Quartz-muscovite gneiss							12	2.69	25000
101	79 SWH 52	Muscovite graphitic schist							11	2.67	3300
102	79 SWH 53	Quartz greenstone							35	2.96	21000
103	79 SWH 54	Feldspathic gneissic schist							70	2.87	2100
104	79 SWH 55	Feldspathic gneissic schist							1.0	2.65	5200
105	79 SWH 56	Quartz greenstone							46	2.92	550
106	79 SWH 57	Gray sandy dolomite							1.0	2.56	1300
107	79 SWH 58	Ferruginous quartz-chlorite calc-schist							39	2.77	4800

* For DGGS by Elliot Geophysical Company, Tucson, Arizona
⊛ No orientation on sample
△ Friable sample: not possible to prepare for measurement

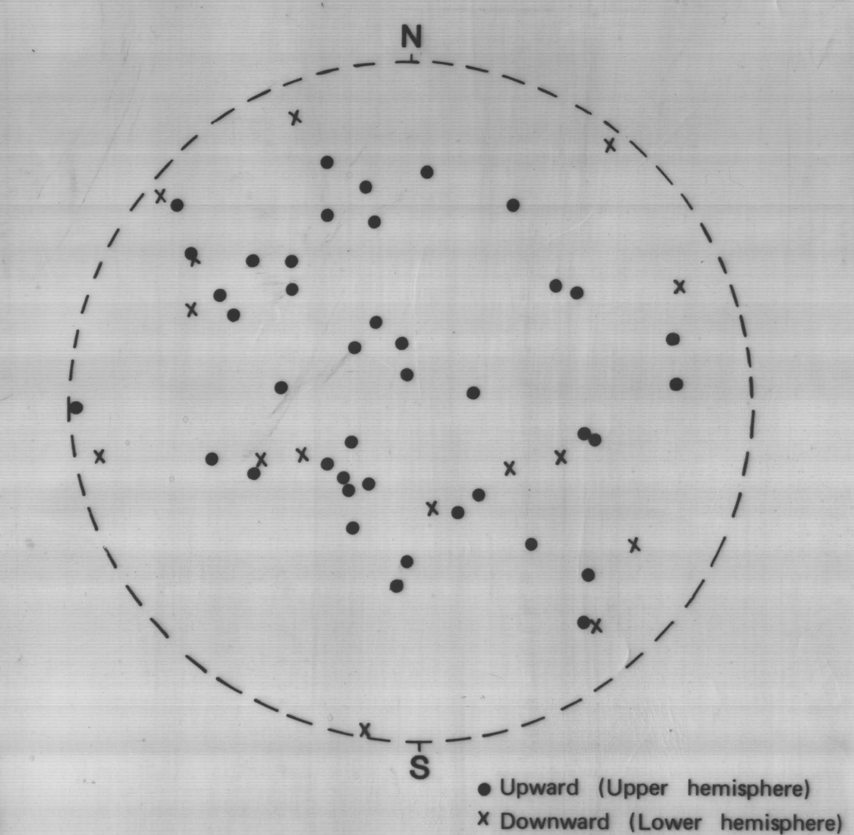


Figure 1. Stereographic plot of directions of natural remanent magnetization for Paleozoic and Precambrian(?) rocks, southwest Wiseman Quadrangle, Alaska. Data are not corrected for regional geologic dip. Equal-area projection: lower hemisphere (x), upper hemisphere (o).

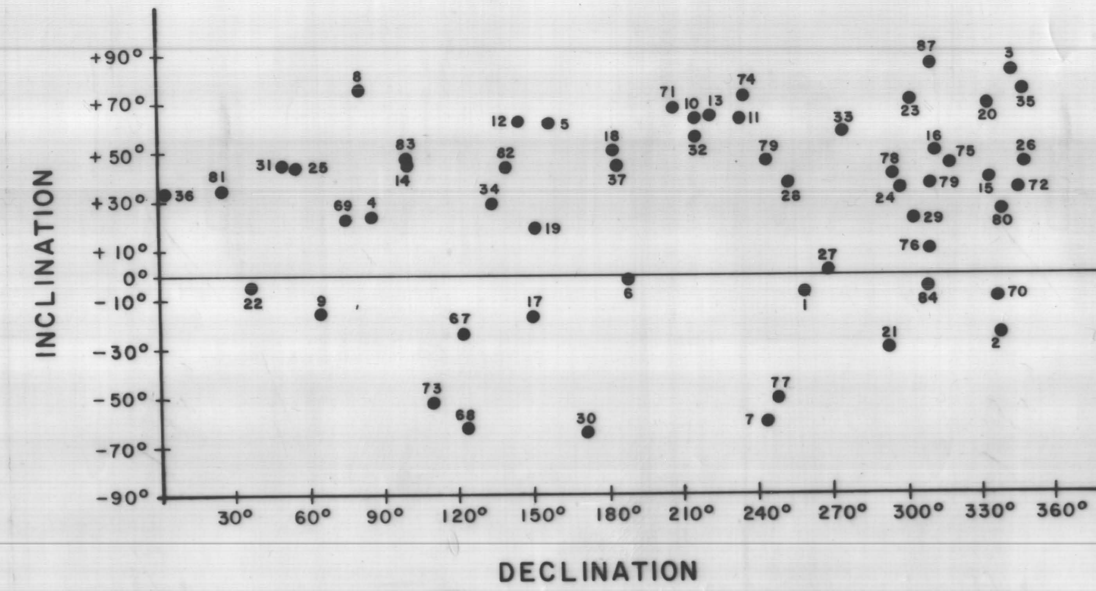


Figure 2. Direction of natural remanent magnetization for 37 rock samples, southwest Wiseman Quadrangle, Alaska. Data are not corrected for geologic dip.

PHYSICAL ROCK PROPERTY VALUES FOR SELECTED ROCK TYPES, SOUTHWESTERN CORNER, WISEMAN QUADRANGLE, ALASKA

by

Steve W. Hackett and John T. Dillon

1982