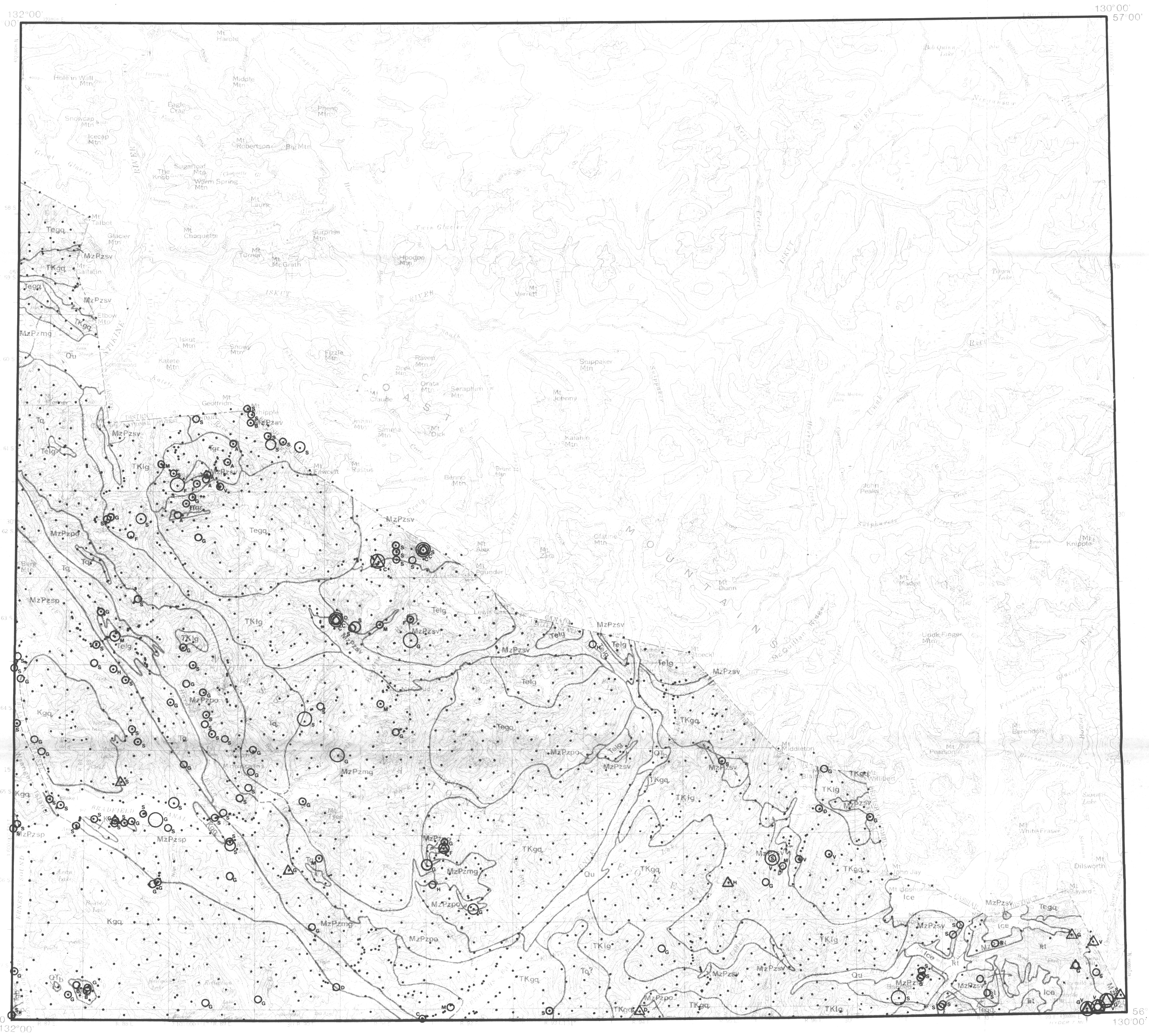
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

OPEN FILE REPORT
81-728-C
SHEET 1 OF 2

FOLIO OF THE BRADFIELD CANAL QUADRANGLE, ALASKA
KOCH AND ELLIOTT--GEOCHEMISTRY-Au,Ag

GOLD AND SILVER IN ROCK SAMPLES
(atomic absoption and spectrographic determinations)

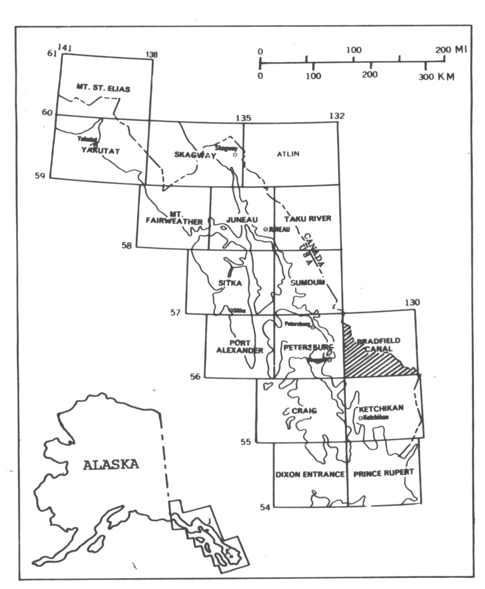


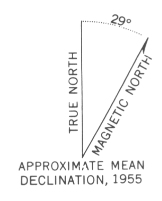
Base from USGS 1:250,000 topo series:
Bradfield Canal, 1955, ALASKA-CANADA.

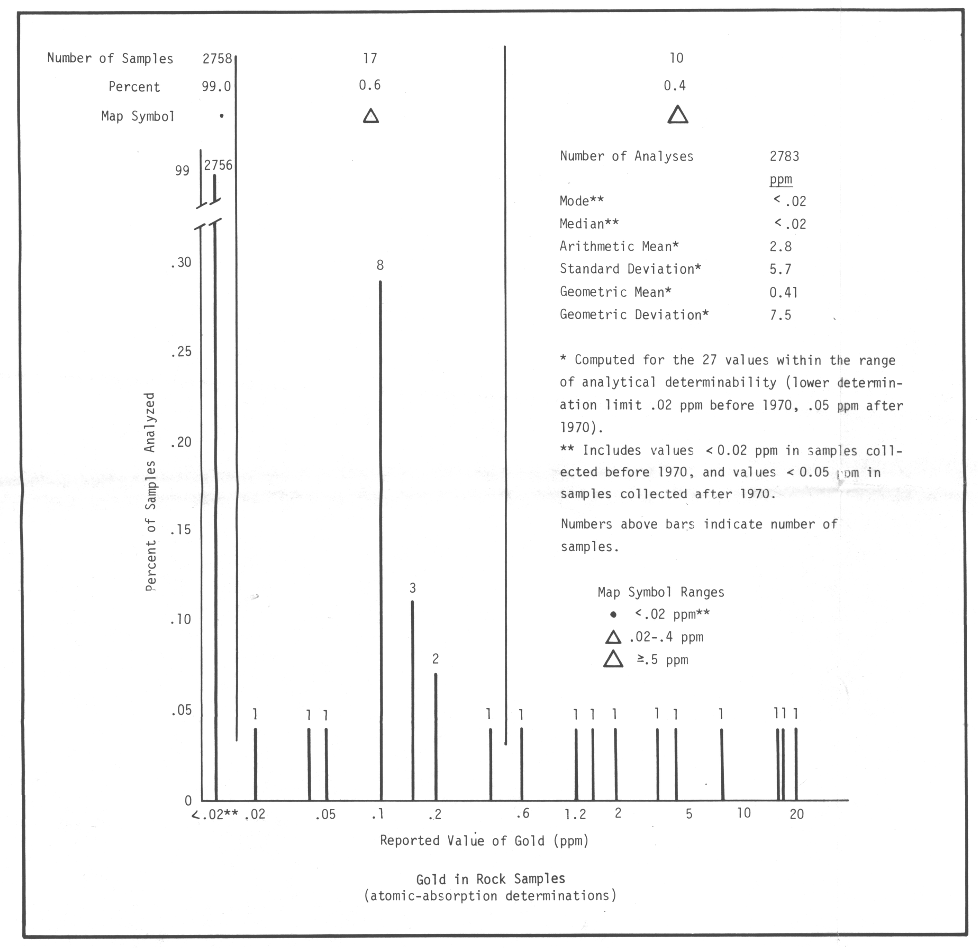
ROCK SAMPLES

Geology by H. C. Berg, D. A. Brew, A. L. Clark, W. H. Condon, J. E. Decker, M. F. Diggles, G. C. Dunne, R. L. Elliott, J. D. Gallinatti, M. H. Herdrick, S. M. Karl, R. D. Koch, M. L. Miller-Hoare, R. P. Morrell, J. G. Smith, and R. A. Sonnevil, 1968-1979.

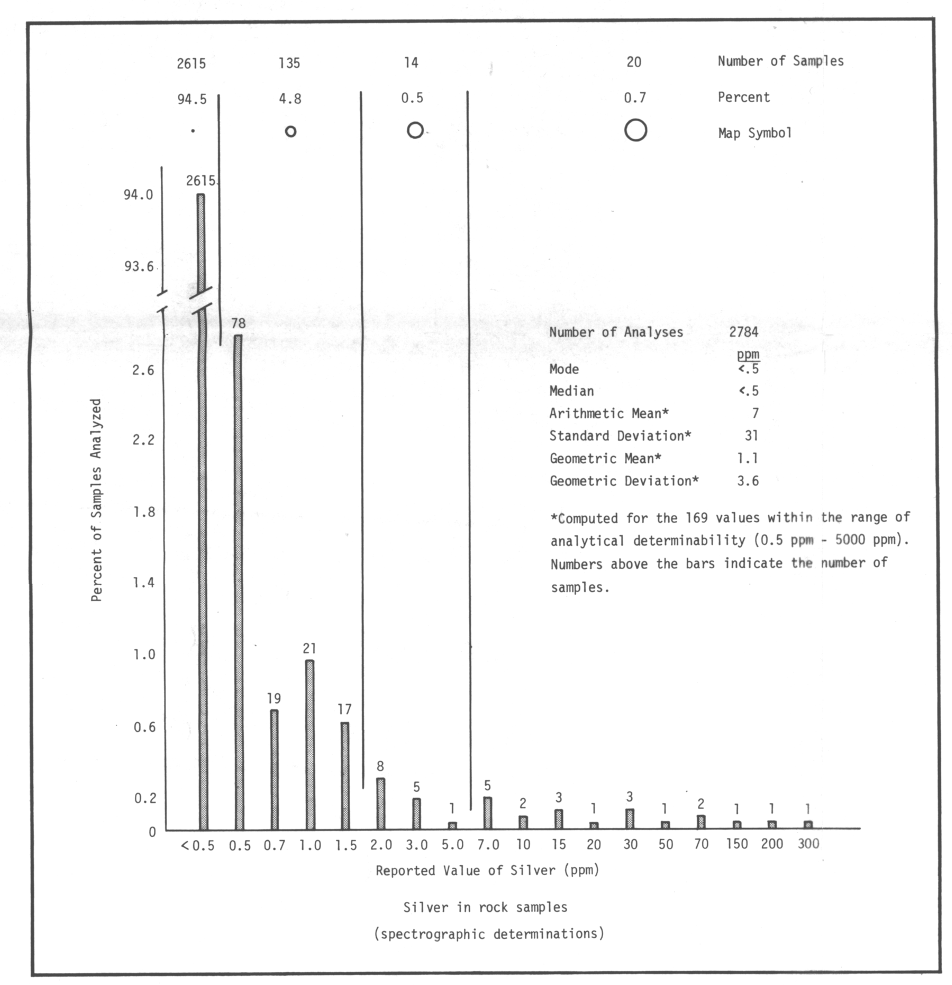
SCALE 1:250 000
25 MILES
25 KILOMETERS
CONTOUR INTERVAL 200 FEET
DATUM IS MEAN SEA LEVEL




APPROXIMATE MEAN DECLINATION, 1955



Gold in Rock Samples
(atomic-absorption determinations)



Silver in rock samples
(spectrographic determinations)

Discussion

During U.S. Geological Survey investigations in the Bradfield Canal quadrangle between 1968 and 1979, 2784 rock geochemical samples, 1295 stream-sediment samples, and 219 stream-sediment heavy-mineral concentrate samples were collected. The samples were analyzed for up to 31 elements by a 6-step, semi-quantitative emission spectrographic method (Grimes and Marranzino, 1968) and for up to 5 elements by atomic-absorbtion techniques (Ward and others, 1969). Complete analytical data for all samples, plus location maps, station coordinates, and a discussion of sampling and analytical procedures are available in 3 reports (Koch and others, 1980a,b,c). These data are also available on magnetic computer tape (Koch, O'Leary, and Risoli, 1980). Maps on this and the accompanying sheet show the amounts of silver (Ag) and gold (Au) detected in all geochemical samples collected in the Bradfield Canal quadrangle. Gold analyses of rock and stream-sediment samples were by atomic-absorbtion spectrophotometry. Gold analyses of heavy-mineral concentrates, and all silver analyses were by the 6-step spectrographic method.

Average geochemical abundances vary for different lithologies and in different areas. The degree of chemical weathering also affects the elemental abundances, although probably with minor effect in this recently glaciated terrain. Varitations in sampling practice and analytical variance reduce the repeatability of these data. The complex interactions between these sources of variation make it impossible to select a single threshold value which will discriminate between areas which are barren and areas with potentially valuable mineral concentrations. Because of the potential economic value of even small deposits of gold and silver, and because the determination limits for analyses of these elements are relatively high compared to normal crustal abundances, all samples for which either gold or silver was detected are considered to be potentially significant.

The analytical values have been grouped into ranges, with each range represented on the map by a different symbol or symbol size. Samples in which Ag or Au was detected are marked with circles (for Ag) and triangles (for Au). Samples in which no Ag or Au was detected are indicated on the map by dots. The range of values, and number and percentage of values associated with each map symbol are indicated on the corresponding histogram. Higher values may indicate a greater likelihood of bedrock mineralization but confidence levels are low for values near analytical limits of determinability, for single-element anomalies, and for results not supported by high values in nearby samples.

Each rock sample was assigned to one of ten broad lithologic groups of similar rock types on the basis of the rock name given to the sample at the time that it was collected. The types of rock included in each of the groups are summarized in the table labelled "Key to Lithology Group Symbols". Circles and triangles representing rock samples with detectable Ag or Au are labelled with the letter indicating the lithology group for that sample.

Among the rock samples, both gold and silver were detected most often within the metamorphic units MzPzsp (mainly in schists), MzPzpo (in schists and some granitic rocks), and MzPzsv (in schist, hornfels, and skarns). Granitic rocks generally appear barren with the significant exception of the alkali-feldspar granite at Cone Mountain and its associated felsite dikes. Both of these lithologies commonly contain significant levels of Ag. The highest concentrations of both Au and Ag are in vein samples from the southeastern corner of the study area. This area contains a number of small prospects.

Stream-sediment samples with detected Ag or Au show a more restricted geographic distribution than rock samples do. Throughout most of the study area, both elements appear related to areas of paragneiss and schist, and to the area of the Cone Mountain stock. The heaviest concentration of sites having samples with detectable Au and Ag is in the Texas Creek and Salmon River areas in the southeastern corner of the quadrangle.

Only eight stream-sediment heavy-mineral concentrate samples had detectable Ag and Au was detected in only one sample. Most of these samples come from within or near metamorphic rock units.

Average abundance[1/] of gold and silver in the Earth's crust and various crustal components. (From Levinson, 1974)

	Earth's crust	Ultramafic	Basalt	Granodiorite	Granite	Shale	Limestone	Soil
Au	0.004	0.005	0.004	0.004	0.004	0.004	0.005	-
Ag	0.07	0.06	0.1	0.07	0.04	0.05	1	0.1

[1/] Note: Because the analyses on which these averages are based may not be directly comparable to the analyses used for this report, these figures serve only as a general guide.

KEY TO LITHOLOGY GROUP SYMBOLS

A - ALKALI-FELDSPAR GRANITE - includes related dikes

B - BASALT and ANDESITE - includes dikes and flows, and lamprophyre dikes

C - CALCSILICATE and SKARN

D - DIORITE and GABBRO - includes minor metadiorite, hornblendite, and ultramafic rocks

F - FELSITE - some quartz-porphyritic. Includes dikes, flows(?), and breccias

G - GRANITIC ROCKS - mainly massive and foliated quartz monzonite, granodiorite, and quartz diorite, with lesser alaskite, aplite, and pegmatite

H - HORNBLENDE-RICH SCHIST and GNEISS - includes amphibolite, greenschist, and other mafic metamorphic rocks

M - MIGMATITE and ORTHOGNEISS - includes granitic gneiss (eg: granodiorite gneiss, quartz diorite gneiss, etc.)

S - SCHIST and GNEISS - mainly pelitic and quartzofeldspathic schist and gneiss, and lesser non-schistose metasedimentary rocks

V - VEINS

Unit Descriptions

Qu	UNCONSOLIDATED DEPOSITS, UNDIVIDED (Quaternary)
QTb	BASALT (Quaternary and Tertiary?)
Tgr	ALKALI-FELDSPAR GRANITE WITH ASSOCIATED QUARTZ-PORPHYRITIC RHYOLITE DIKES AND FLOWS(?) (Miocene?)
Tgb	BIOTITE-PYROXENE GABBRO, LOCALLY CONTAINS HORNBLENDE AND/OR OLIVINE (Miocene)
Telg	LEUCOCRATIC QUARTZ MONZONITE AND GRANODIORITE (Eocene)
Tegq	GRANODIORITE AND QUARTZ DIORITE (Eocene)
Tq	QUARTZ DIORITE (Eocene or Paleocene)
TKlg	LEUCOCRATIC QUARTZ MONZONITE AND GRANODIORITE (Tertiary and/or Cretaceous)
TKgq	GRANODIORITE AND QUARTZ DIORITE (Tertiary and/or Cretaceous)
Kgq	BIOTITE-HORNBLENDE QUARTZ DIORITE, PLAGIOCLASE-PORPHYRITIC BIOTITE GRANODIORITE/QUARTZ DIORITE, BOTH LOCALLY CONTAIN GARNET AND/OR EPIDOTE (Cretaceous)
₹t	TEXAS CREEK GRANODIORITE (Triassic)
MzPzmg	MIGMATITE AND ORTHOGNEISS, WITH LESSER PARAGNEISS (Mesozoic and/or Paleozoic)
MzPzpo	PARAGNEISS AND ORTHOGNEISS, WITH LESSER AMPHIBOLITE AND MARBLE (Mesozoic and/or Paleozoic)
MzPzsp	SCHIST AND PARAGNEISS, WITH LESSER AMPHIBOLITE AND MARBLE (Mesozoic and/or Paleozoic)
MzPzsv	METASEDIMENTARY AND LESSER METAVOLCANIC ROCKS, WITH LOCAL MARBLE (Mesozoic and/or Paleozoic)

SELECTED REFERENCES

Berg, H. C., Elliott, R. L., Smith, J. G., and others, 1977, Mineral resources of the Granite Fiords wilderness study area, Alaska: U.S. Geological Survey Bulletin 1403, 151 p.

Grimes, D. J., and Marranzino, A. P., 1968, Direct-current arc and alternating-current spark emission spectrographic field methods for the semiquantitative analysis of geologic materials: U.S. Geological Survey Circular 591, 6 p.

Koch, R. D., Elliott, R. L., O'Leary, R. M., and Risoli, D. A., 1980a, Trace element data for rock samples from the Bradfield Canal quadrangle, southeastern Alaska: U.S. Geological Survey Open-File Report 80-910A, 256 p.

_____, 1980b, Trace element data for stream-sediment samples from the Bradfield Canal quadrangle, southeastern Alaska: U.S. Geological Survey Open-File Report 80-910B, 172 p.

_____, 1980c, Trace element data for stream-sediment heavy-mineral concentrate samples from the Bradfield Canal quadrangle, southeastern Alaska: U.S. Geological Survey Open-File Report 80-910C, 68 p.

Koch, R D., O'Leary, R. M., and Risoli, D. A., 1980, Magnetic tape containing trace element data for rock, stream-sediment, and stream-sediment heavy-mineral concentrate samples from the Bradfield Canal quadrangle, southeastern Alaska: Menlo Park, California, U.S. Geological Survey Report, 23 p., computer tape. Available from the U.S. Department of Commerce, National Technical Information Service, Springfield VA 22151, as report USGS-GD-80-004 or NTIS-PB81-108641.

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Ward, F. N., Nakagawa, H. M., Harms, T. F., and Van Sickle, G. H., 1969, Atomic-absorption methods of analysis useful in geochemical exploration: U.S. Geological Survey Bulletin 1289, 45 p.

MAPS SHOWING DISTRIBUTION AND ABUNDANCE OF GOLD AND SILVER IN GEOCHEMICAL SAMPLES FROM BRADFIELD CANAL QUADRANGLE, SOUTHEASTERN ALASKA

by

R. D. KOCH AND R. L. ELLIOTT

1981

This report is preliminary and has not been reviewed for conformity with Geological Survey editorial standards and stratigraphic nomenclature.