DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

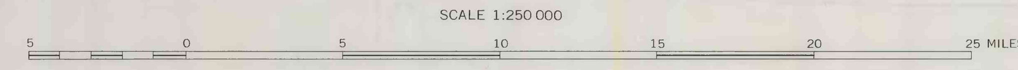
OPEN FILE REPORT
78-558L

Geochemistry-Bismuth (Bi)

Folio of the TALKEETNA MOUNTAINS Quadrangle, Alaska

Base map from U.S. Geological Survey, 1:250,000
Talkeetna Mountains Quadrangle, Alaska, 1955

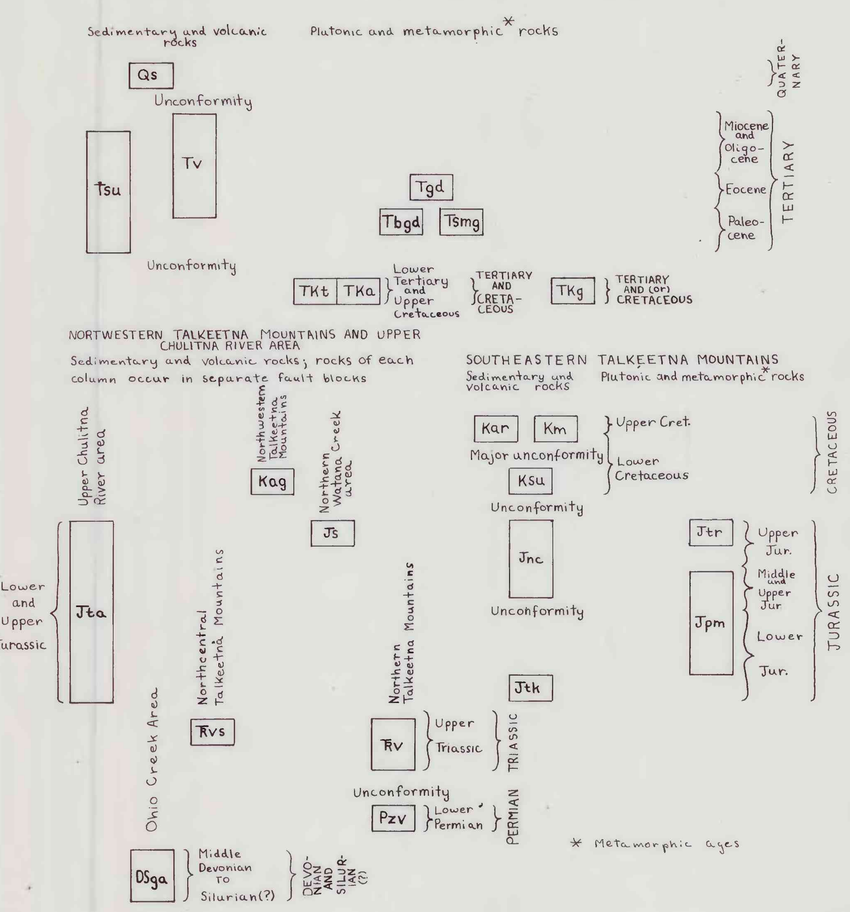
SCALE 1:250 000



CONTOUR INTERVAL 200 FEET
DATUM IS MEAN SEA LEVEL

CORRELATION OF MAP UNITS

Geology generalized after Csejtey and others, 1978



DESCRIPTION OF MAP UNITS

Qs SURFICIAL DEPOSITS, UNDIFFERENTIATED (Quaternary).

Tv VOLCANIC ROCKS, UNDIVIDED (Paleocene to Pleistocene(?))--Felsic and mafic subaerial volcanic rocks and related shallow intrusions.

Tsu TERTIARY SEDIMENTARY ROCKS, UNDIFFERENTIATED (Paleocene to Miocene)--Terrestrial, mostly fluviatile strata with a few lignite interbeds.

Tgd GRANODIORITE (Eocene).

Tbgd BIOTITE AND HORNBLENDE GRANODIORITE (Paleocene, in part early Eocene).

Tsmg SCHIST, MIGMATITE, AND GRANITE (Paleocene intrusive and metamorphic ages)--Migmatitic border zone of biotite and hornblende granodiorite.

TKt TONALITE (Upper Cretaceous and lower Paleocene).

TKa ADAMELLITE (Upper Cretaceous and lower Paleocene).

TKg GRANITIC ROCKS, UNDIVIDED (Cretaceous and (or) Tertiary).

Kar ARKOSE RIDGE FORMATION (Lower and (or) Upper Cretaceous).

Km MATANUSKA FORMATION (Lower and Upper Cretaceous).

Ksu SEDIMENTARY ROCKS, UNDIVIDED (Lower Cretaceous)--Shallow marine sequence of calcareous sandstone, claystone, and massive clastic limestone.

Kag ARGILLITE AND LITHIC GRAYWACKE (Lower Cretaceous)--Intercalated, marine, flyschlike sequence.

Js SEDIMENTARY AND VOLCANIC ROCKS, UNDIVIDED (Upper Jurassic)--Marine sequence of argillite, graywacke, conglomerate, and andesitic to latitic feldspar porphyry dikes and intercalated flows.

Jtr TRONDHJEMITE (Upper Jurassic)

Jnc JURASSIC SEDIMENTARY ROCKS, UNDIVIDED (Middle and Upper Jurassic)--Includes Naknek and Chinitna Formations, and Tuxedni Group.

Jta CRYSTAL TUFF, ARGILLITE, CHERT, GRAYWACKE, AND LIMESTONE (Lower to Upper Jurassic)--Shallow to moderately deep marine, intercalated sequence.

Jpm PLUTONIC AND METAMORPHIC ROCKS, UNDIFFERENTIATED (Lower to Upper Jurassic)--Mainly quartz diorite, granodiorite, amphibolite, and greenschist.

Jtk TALKEETNA FORMATION (Lower Jurassic).

T̄Rvs METABASALT AND SLATE (Upper Triassic)--Intercalated, shallow-water marine sequence.

T̄Rv BASALTIC METAVOLCANIC ROCKS (Upper Triassic)--Mainly shallow water marine metabasalt flows.

Pzv BASALTIC AND ANDESITIC METAVOLCANOGENIC ROCKS (Pennsylvanian(?) and Early Permian)--Metamorphosed marine sequence of interlayered basaltic to andesitic flows, tuffs, coarse volcaniclastic rocks, and subordinate mudstone and limestone.

DSga GRAYWACKE, ARGILLITE, SHALE, AND LIMESTONE (Silurian(?) to Middle Devonian)--Intercalated marine sequence, probably continental margin deposits.

EXPLANATION OF GEOLOGIC MAP SYMBOLS

Contact, approximately located

Approximate contact of surficial deposits

Fault

Long dashed where approximately located; short dashed where inferred; dotted where concealed. U indicates upthrown side where direction of displacement is known. Arrows indicate relative lateral movement

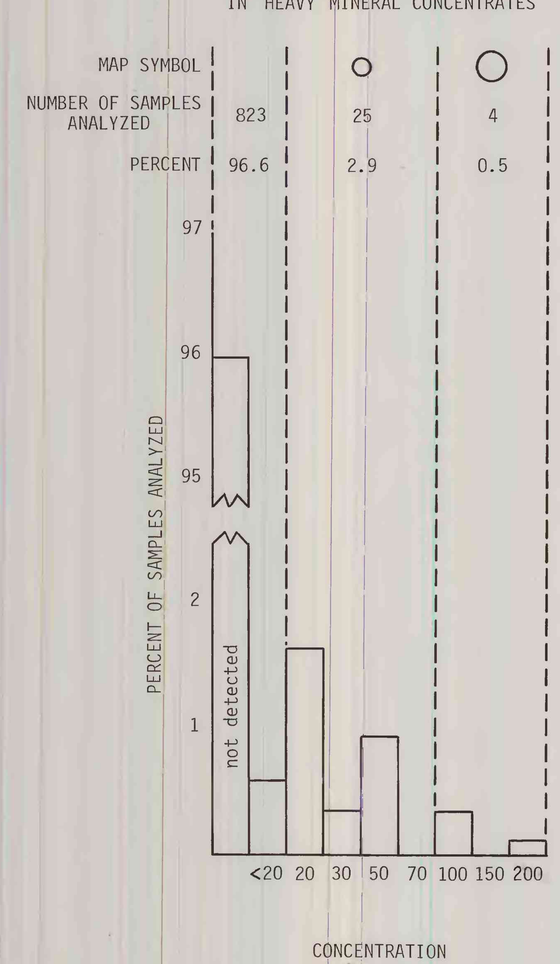
Thrust fault

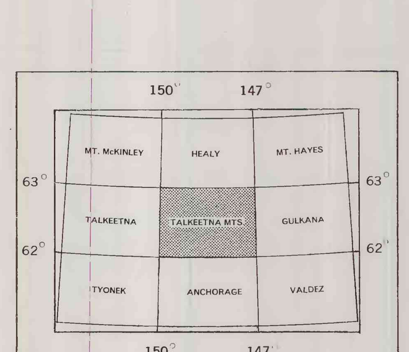
Long dashed where approximately located, dotted where concealed. Teeth indicate upthrown side.

Approximate axis of intense shear zone of variable width, possibly marking a thrust fault

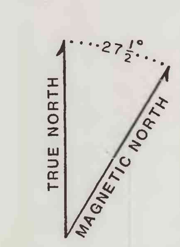
Dotted where concealed; teeth indicate possible upthrown side of postulated thrust

HISTOGRAM SHOWING DISTRIBUTION OF BISMUTH IN HEAVY MINERAL CONCENTRATES





Location Index



APPROXIMATE MEAN DECLINATION, 1951

EXPLANATION OF GEOCHEMICAL MAP SYMBOLS

▲ - Location of stream sediment sample

■ - Location of heavy mineral concentrate sample

• - Location of both stream sediment and heavy mineral concentrate sample

△ - Stream sediment sample with possibly significant bismuth value.

○ - Heavy mineral concentrate sample with possibly significant bismuth value. Increase in symbol size indicates higher analytical value as shown on histogram.

EXPLANATORY STATEMENT

In the course of U.S.Geological Survey investigations of the Talkeetna Mountains quadrangle, 1118 stream sediment, 852 heavy mineral concentrate, and 501 rock samples were collected. All of these samples were analyzed for up to 30 elements by a six-step semi-quantitative spectrographic method(Grimes and Marranzino, 1968). Most of the stream sediment and rock samples were also analyzed for up to 4 elements by atomic absorption spectrophotometry, as described by Ward and others(1969). The present map shows the sample collection sites of 1117 stream sediment samples and 852 heavy mineral concentrates which were analyzed for bismuth by the spectrographic method. Only one of the stream sediment analyses showed a concentration of bismuth above the lower limit of analytical determinability. Therefore, a histogram for this media was not included. Complete analytical data plus location maps, station coordinates, and discussion of sampling and analytical procedures for samples from sites shown on the present map are published in a report by Miller and others(1978).

Concentration of metals in geochemical samples varies for different lithologies and in different areas. Because of this, as well as variability introduced from other sources such as sampling practice, analytical variance, and degree of chemical weathering, it is impossible to select a specific analytical level above which values might indicate the presence of bismuth deposits. For this reason, the analytical values have been grouped into ranges (see histograms), each range being represented by a different symbol on the map. Higher values may indicate a greater likelihood of bismuth deposits, but confidence levels are low for "single-element" anomalies and for results which are not supported by neighboring values.

REFERENCES CITED

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

Miller, R. J., Cooley, E.F., O'Leary, R. M., Garmezy, Larry, Csejtey, Béla, Jr., Smith, T. E. and Cleveland M. N.,1978, Analyses of geochemical samples from the Talkeetna Mountains quadrangle, Alaska: U.S. Geol. Survey open-file rept. 78-1052, 279 p.

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. Geol. Survey Bull. 1289, 45 p.

MAP SHOWING GEOCHEMICAL DISTRIBUTION AND ABUNDANCE OF BISMUTH IN STREAM SEDIMENTS AND HEAVY MINERAL CONCENTRATES, TALKEETNA MOUNTAINS QUADRANGLE, ALASKA

by

R. J. Miller, G. C. Curtin, and Béla Csejtey, Jr.

1978