DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

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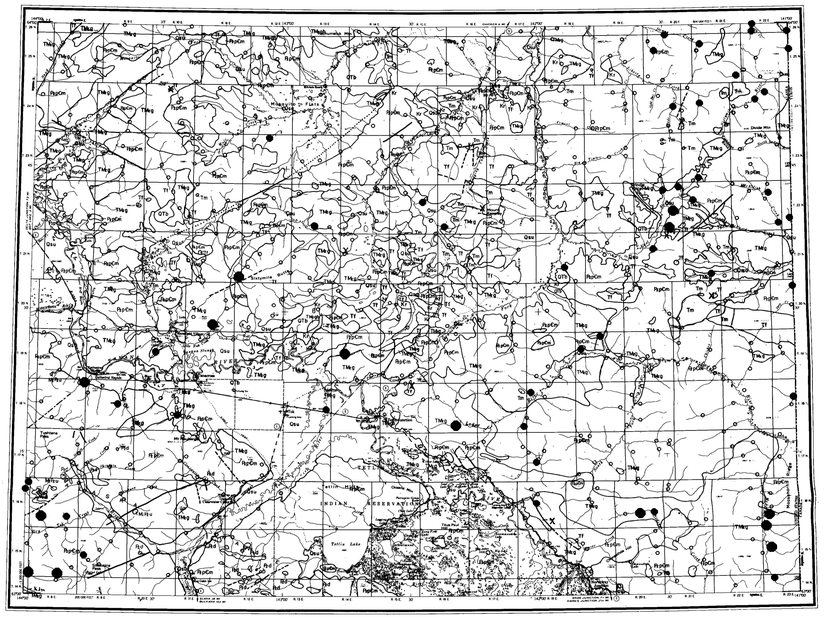
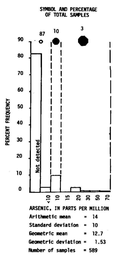
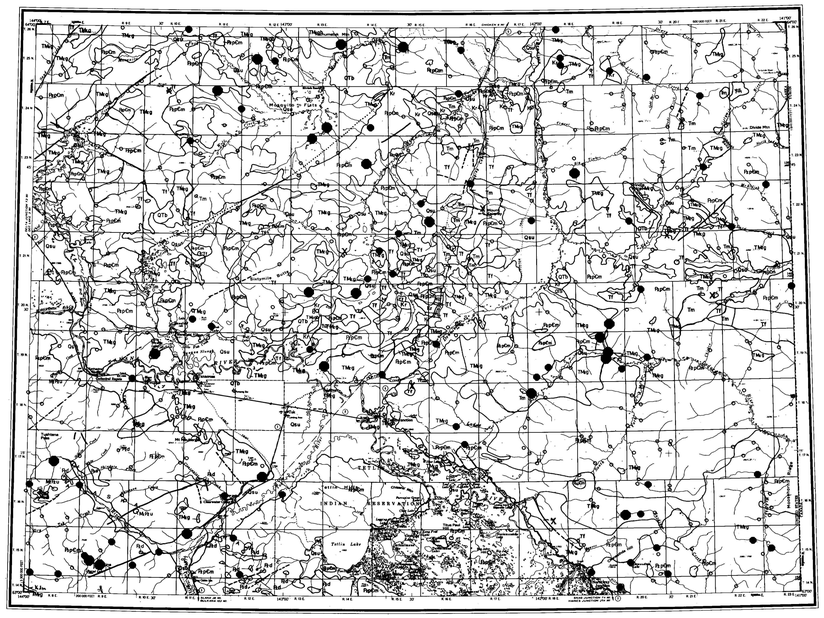
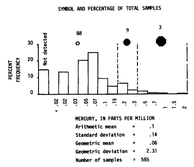


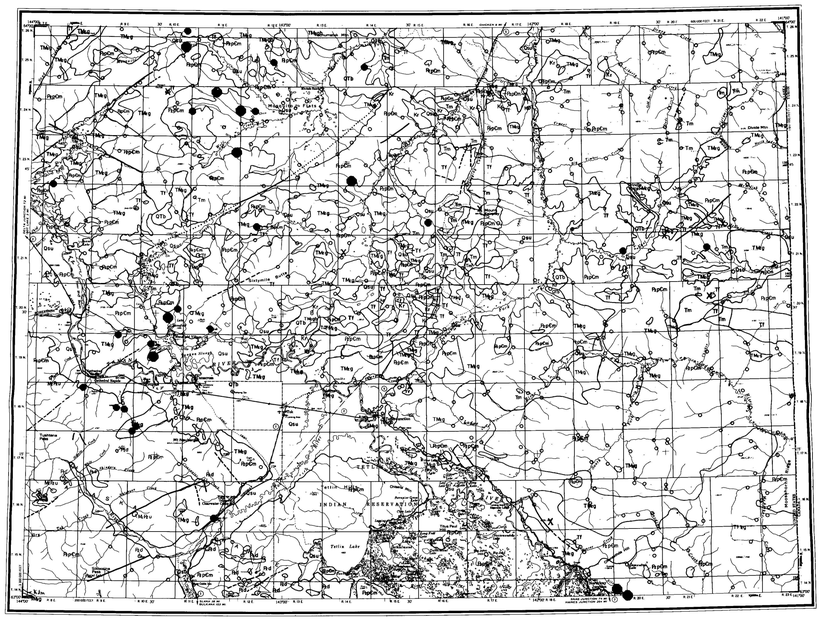


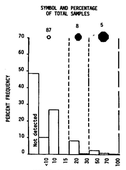
A. Arsenic in the minus-80-mesh stream sediment





C. Mercury in the minus-80-mesh stream sediment





B. Arsenic in the ash of streambank sod

DISCUSSION

This series of geochemical maps shows the distribution of arsenic and mercury in the minus-80-mesh stream sediment and of arsenic in the ash of streambank sod (mixed organic and inorganic material) collected beneath the water level. The geochemical data are plotted on a base map that shows generalized geology and the drainage pattern. The map symbols show sample sites and ranges of values in the following manner: (1) open symbols denote background, (2) small black symbols represent weakly anomalous values , and (3) large black symbols denote strongly anomalous values. Because the small black symbols represent weakly anomalous values, they are considered to be significant only where they correlate with strongly anomalous metal values either in the same or in other sample media. The ranges of values represented by the symbols are shown on the histograms that accompany the geochemical maps. An explanation of sampling, preparation, and analytical procedures is given in Circular 734, which accompanies this folio. Complete analytical data for geochemical samples collected by the U.S. Geological Survey in the Tanacross quadrangle are available in a U.S. Geological Survey open-file report (O'Leary and others, 1976).

The arsenic content of the streambank sod represents both arsenic scavenged from solution primarily by the organic material and the arsenic content of the detrital material in the sod. The arsenic and mercury content of the minus-80-mesh stream sediment, on the other hand, mainly represents the amount of each of the elements in the detrital material of the stream sediment.

The influence of the organic content on the variation of arsenic in the sod was judged to be too small to warrant adjusting the arsenic values using regression analysis. Therefore, the unaltered arsenic values in sod ash are shown on the map and in the accompanying histogram of figure B.

The arsenic distribution pattern in the ash of streambank sod (fig. B) indicates two anomalous areas in the western part of the quadrangle. In the southernmost of these areas, the anomalous arsenic values roughly correlate with high copper, zinc, and molybdenum values in sod ash (Curtin and others, 1976a, b; Curtin, Day, Carten, and others, 1976). This anomalous arsenic pattern along with those of copper, molybdenum, and zinc suggest that mineralized rock is the most likely source of the metals in the sod.

The distribution of anomalous arsenic in minus-80-mesh stream sediment (fig. A) correlates with that of arsenic in sod ash at only four sites, all of which are in the west-central part of the quadrangle. None of these high values is associated with known occurrences of mineralized rock. However, strongly anomalous arsenic values in the minus-80-mesh stream sediment are associated with occurrences of mineralized rock or possibly mineralized rock in the eastern part of the quadrangle.

Two strongly anomalous arsenic values and one weakly anomalous value near the east-central part of the quadrangle (T. 22 N., R. 20-21 E.) were detected in samples collected in streams draining an area that includes at least one porphyry copper prospect. These high values probably reflect the presence of arsenopyrite within the mineralized rock.

In the southeastern corner of the quadrangle (T. 15 N. and T. 16 N., R. 23 E.) a cluster of three strongly anomalous arsenic values in the minus-80-mesh stream sediment may reflect the presence of gold-quartz veins within the granitic bedrock. Gold from quartz veins is being placer mined just east of the Alaska-Yukon border in the eastern drainage of Moosehorn Ridge, and additional gold-quartz veins and gold placers may exist on the west side of the ridge. Other high arsenic values north of the Tanana River, especially the strongly anomalous values, suggest the presence of additional zones of mineralized rock.

In that part of the quadrangle north of the Tanana River, seven base metal prospects are not defined by anomalous arsenic values in either of the two sample media. These prospects are located in T. 24 N., R. 10 E.; T. 21 N., R. 14 E.; T. 22 N., R. 16 E.; T. 18 N., R. 15 E.; T. 16 N., R. 18 E.; T. 20 N., R. 21 E.; and in T. 22 N., R. 21 E. The absence of anomalous arsenic values around the prospects indicates either that the arsenic content of the altered and mineralized rock is low or that the amount of mineralized rock is too small to produce arsenic-bearing dispersion trains that could be detected at the sampling density used in this study.

Arsenic distributions are not shown for either the oxide residue of stream sediment or moss ash because only a few values were detected at or above the detection limit (200 ppm) for the analytical method used.

The distribution of mercury in minus-80-mesh stream sediment (fig. C) is rather scattered and strongly anomalous mercury values do not correlate with known mineralized zones in that part of the quadrangle north of the Tanana River. The strongly anomalous mercury values may, however, represent mercury that has migrated to the surface from deeply concealed zones of mineralized rock.

The anomalous arsenic and mercury values detected in the Alaska Range, in the southwest corner of the quadrangle, probably reflect the presence of small mineralized veins and shear zones that are known to occur in this area.

REFERENCES CITED

Curtin, G. C., Day, G. W., Carten, R. B., Marsh, S. P., and Tripp, R. B., 1976, Geochemical maps showing the distribution and abundance of molybdenum in the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-767G, 1 sheet, scale 1:500,000.

Curtin, G. C., Day, G. W., O'Leary, R. M., Marsh, S. P., and Tripp, R. B., 1976a, Geochemical maps showing the distribution and abundance of copper in the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-767F, 1 sheet, scale 1:500,000.

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Foster, H. L., 1970, Reconnaissance geologic map of the Tanacross quadrangle, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-593, scale 1:250,000.

O'Leary, R. M., McDanal, S. K., McDougal, C. M., Day, G. W., Curtin, G. C., and Foster, H. L., 1976, Spectrographic and chemical analyses of geochemical samples and related data from the Tanacross quadrangle, Alaska: U.S. Geol. Survey open-file rept. 76-422, 94 p.

EXPLANATION

GEOLOGY GENERALIZED FROM FOSTER (1970)

CORRELATION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qsu — QUATERNARY

SEDIMENTARY ROCKS

IGNEOUS AND METAMORPHIC ROCKS

QTs — QUATERNARY AND TERTIARY

Tm, Tf — TERTIARY(?)

Trhg, Trhgb — TERTIARY OR MESOZOIC

Kr — CRETACEOUS(?)

KJm — CRETACEOUS OR JURASSIC

Pzbu — MESOZOIC OR PALEOZOIC

Pd — PALEOZOIC(?)

p€pCm — PALEOZOIC AND (OR) PRECAMBRIAN

DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qsu — UNCONSOLIDATED SEDIMENTARY DEPOSITS

SEDIMENTARY ROCKS

Kr — DETRITAL ROCKS (CRETACEOUS?)

KJm — MENTASTA ARGILLITE OF RICHTER (1967) (JURASSIC OR CRETACEOUS)

IGNEOUS AND METAMORPHIC ROCKS

QTs — BASALT

Tm — MAFIC VOLCANIC ROCKS

Tf — FELSIC TUFF, WELDED TUFF, LAVA, AND HYPABYSSAL INTRUSIVE ROCKS

Trhg — GRANITIC ROCKS, UNDIVIDED

Trhgb — GABBRO

Pzbu — ULTRAMAFIC ROCKS

Pd — DIORITE

p€pCm — METAMORPHIC ROCKS, UNDIVIDED

GEOLOGIC SYMBOLS

CONTACT, APPROXIMATELY LOCATED

FAULT, DASHED WHERE APPROXIMATELY LOCATED, DOTTED WHERE CONCEALED. U, UPTHROWN SIDE; D, DOWNTHROWN SIDE

FAULT OR LINEAMENT FROM AERIAL PHOTOGRAPHS

X BASE METAL PROSPECTS NORTH OF THE TANANA RIVER

GEOCHEMICAL SYMBOLS

BACKGROUND VALUES

WEAKLY ANOMALOUS VALUES

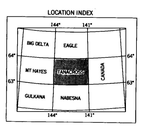
STRONGLY ANOMALOUS VALUES

BASE FROM U. S. GEOLOGICAL SURVEY, 1:250,000, TANACROSS QUADRANGLE, 1964

Scale 1:500,000
1 inch equals approximately 8 miles

10 0 10 20 30 40 Mile

10 0 10 20 30 40 50 Kilometers



GEOCHEMICAL MAPS SHOWING THE DISTRIBUTION AND ABUNDANCE OF ARSENIC AND MERCURY IN THE TANACROSS QUADRANGLE, ALASKA

BY

G. C. CURTIN, R. M. O'LEARY, AND R. B. CARTEN

1976

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