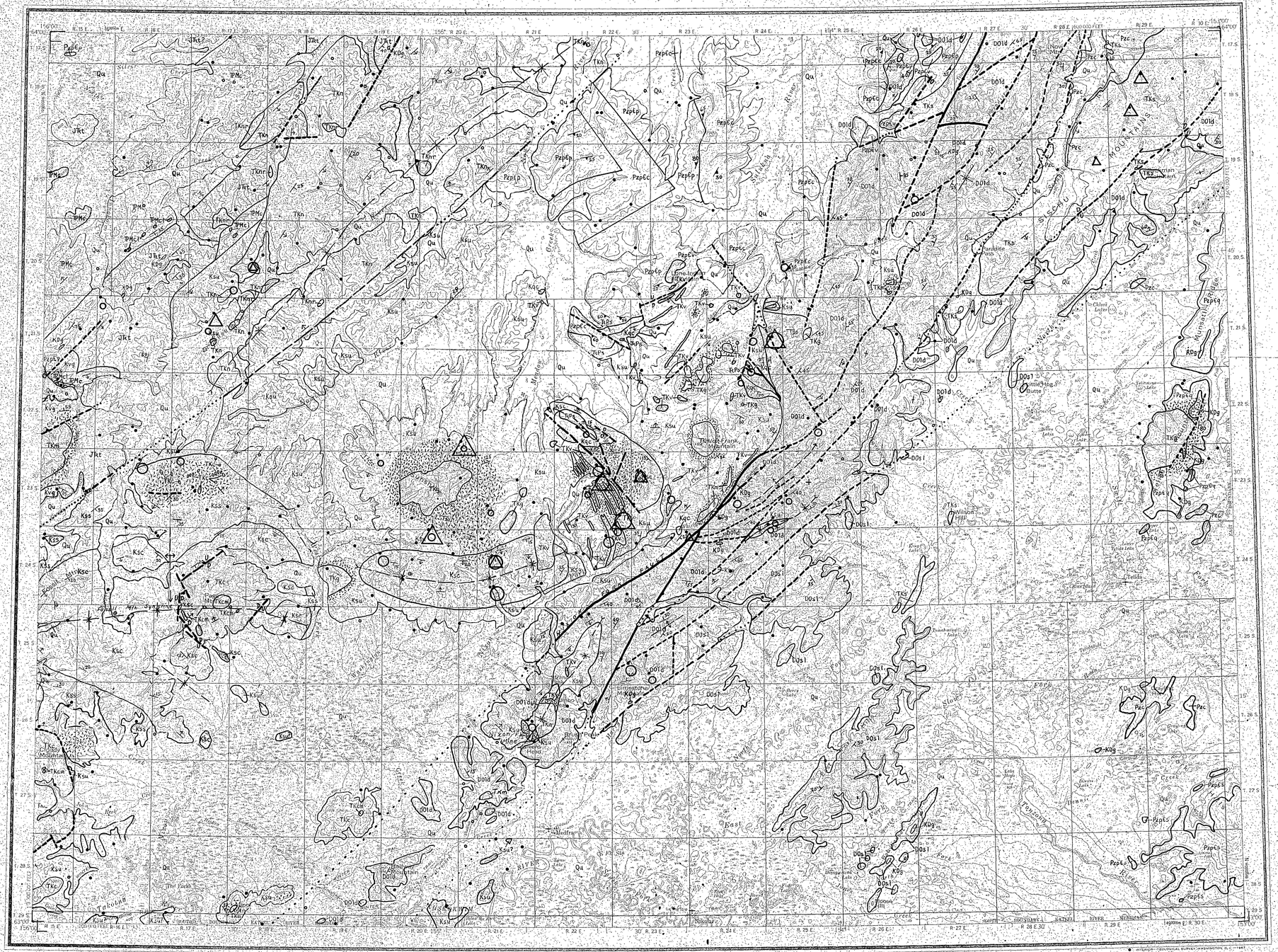
DEPARTMENT OF THE INTERIOR

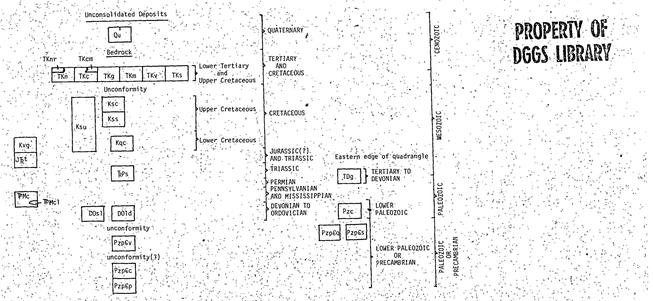
UNITED STATES GEOLOGICAL SURVEY

OPEN-FILE REPORT 80-811 K

SHEET 1 OF 3



CORRELATION OF MAP UNITS

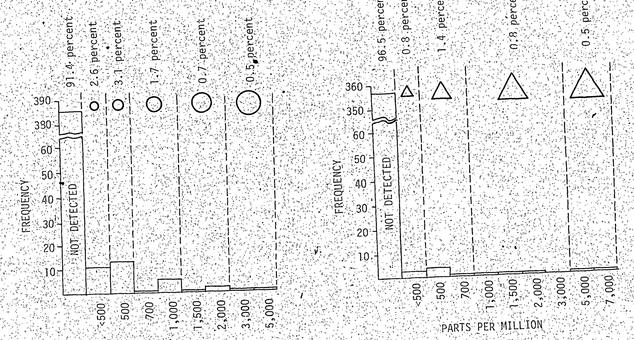


DESCRIPTION OF MAP UNITS

- Qu — UNDIFFERENTIATED SURFICIAL DEPOSITS
- TKnr, TKn — VOLCANIC ROCKS OF THE NOWITNA RIVER AREA--Chiefly trachyandesite, basaltic andesite, and basalt flows. TKnr--Rhyolite domes, tuffs, and breccia.
- TKcm, TKc — MAFIC TO INTERMEDIATE VOLCANO-PLUTONIC COMPLEXES--Altered basalt, andesite, and trachyandesite flows and hypabyssal intrusive bodies. TKcm--Small bodies of monzonite, quartz monzonite, and granodiorite.
- TKg — GRANITE
- TKn — MONZONITE
- TKv — VOLCANIC ROCKS OF NIXON FORK-UPPER SULUKNA RIVER AREA--Rhyolite, dacite, and trachyandesite sills, dikes, flows, and plugs.
- TKs — VOLCANIC ROCKS OF THE SISCHU MOUNTAINS--Rhyolite and dacite flows and domes
- Tdg — GABBRO
- Ksu — UNDIFFERENTIATED SHALE, SILTSTONE, AND SANDSTONE
- Ksc — NONMARINE SANDSTONE AND QUARTZ-CHERT CONGLOMERATE
- Kss — MARINE SANDSTONE, SILTSTONE, AND SHALE
- Kqc — QUARTZ-CARBONATE SANDSTONE AND PEBBLY MUDSTONE
- Kvg — VOLCANIC GRAYWACKE AND CONGLOMERATE
- JTkt — CHERTY TUFF, CRYSTAL AND LITHIC TUFFS, AND VOLCANIC BRECCIA
- JPs — SANDSTONE, SANDY LIMESTONE, SPICULITE, AND CONGLOMERATE
- PMc — CHERT AND LIMESTONE--Chiefly radiolarian chert. PMcl--Limestone.
- DOs — SHALY LIMESTONE
- DOd — LIMESTONE AND DOLOMITE
- Pzc — CHERT AND PHYLLITE
- PzpEq — QUARTZITE, GRIT, AND ARGILLITE
- PzpEs — SHEARED GRIT, QUARTZITE, AND QUARTZ-MICA SCHIST
- PzpEv — METAVOLCANIC ROCKS--Metarhyolite and dacite
- PzpEc — CALC-SCHIST
- PzpEp — PELITIC SCHIST

GEOLOGIC SYMBOLS

- Contact - Includes approximately located, inferred, and indefinite
- Fault - Dashed where approximately located, short dashed where inferred, dotted where concealed. U, upthrown side; D, downthrown side
- Anticline - Showing direction of plunge
- Syncline - Showing direction of plunge
- Strike and dip of beds. May include overturned beds
- Strike of vertical beds
- Horizontal beds
- Strike and dip of beds based on photointerpretation or distant observation
- Strike and dip of foliation
- Zone of hornfels



Arsenic in moderately magnetic heavy-mineral-concentrate samples

Arsenic in nonmagnetic heavy-mineral-concentrate samples

Figure 1.--Histograms for arsenic in 370 nonmagnetic and in 422 moderately magnetic heavy-mineral-concentrate samples, Medfra quadrangle, Alaska, showing symbols denoting concentrations and percentage of total number of samples represented by each range.

ARSENIC IN NONMAGNETIC AND MODERATELY MAGNETIC HEAVY-MINERAL-CONCENTRATE SAMPLES

DISCUSSION

Introduction

These geochemical maps show some results of a reconnaissance geochemical survey done in the Medfra quadrangle, Alaska in 1978 and 1979 as part of the Alaska Mineral Resource Assessment Program. The maps show the distribution and abundance of arsenic and bismuth in 370 nonmagnetic (C3 fraction) and 422 moderately magnetic (C2 fraction) heavy-mineral-concentrate samples, and arsenic in 513 minus-80-mesh stream-sediment samples and 355 ash of aquatic-bryophyte (mosses) samples on a subdued topographic and generalized geologic base. The maps of this report are presented largely to aid users in making their own interpretations. Additional individual-element plots for selected elements are in King and others, 1983a,b,c,d.

SAMPLING, PREPARATION, AND ANALYSIS OF SAMPLES

Most of the samples were taken from channels of active streams with upstream catchment areas averaging about nine km². Samples were taken from first or second order streams whenever possible. Larger, or third order, streams were sampled when helicopter landing sites along first or second order tributary streams were not available. Minus-2-mm stream-sediment was collected for the stream-sediment samples by wet sieving at the sample sites with a stainless-steel screen. Heavy-mineral-concentrate samples were collected by panning the minus-2-mm stream sediment to remove most of the light-mineral fraction.

Samples of aquatic bryophytes were collected from stream channels beneath the water level mainly from the silty sides of the stream channels but also from deadwood and boulders where they were attached. Samples were partially washed in the stream at the sample sites to remove large quantities of silt and sand. No attempt was made to differentiate the various species of bryophytes that were collected.

All samples were partially dried in the field and later completely dried in an oven at the laboratory. After drying, the stream-sediment samples were sieved with an 80-mesh (0.177 mm) screen and the <80-mesh fraction was pulverized to minus 150 mesh in a vertical grinder using ceramic grinding plates. Panned samples were sieved with a 20-mesh (0.8 mm) screen. The <20-mesh fraction was passed through bromoform (specific gravity, 2.86) to remove light-mineral grains not removed in the panning process. Each heavy-mineral concentrate sample was then divided into three fractions based on the magnetic susceptibilities of the mineral grains. A fraction consisting chiefly of magnetite was removed with the use of a hand magnet and a Frantz isodynamic magnetic separator. Two additional fractions were obtained by passing the remaining sample through the Frantz separator at a setting of 0.6 ampere. The fraction composed of mineral grains having no magnetic susceptibility to 0.6 ampere is referred to in this report as the nonmagnetic fraction. The mineralogic composition of the nonmagnetic fraction was determined by visual observation with a binocular microscope. The fraction consisting of mineral grains with magnetic susceptibilities between 0.1 and 0.6 ampere is referred to in this report as the moderately magnetic fraction. Using a microsplitter, a split of each sample of the nonmagnetic and moderately magnetic fractions was obtained. One split was then pulverized to <150 mesh by hand grinding in a mortar and pestle. The ground portion was used for spectrographic analysis.

After oven drying the samples of aquatic bryophytes, most remaining silt and sand was removed by hand and compressed air, followed by several rinses with tap water. The samples were again oven dried, pulverized in a blender, and ashed in a muffle furnace during a 24-hour period with a maximum temperature of 500°C. The ash was passed through a 0.119 mm sieve (145 mesh) to remove most remaining sand grains. The ash of the samples ranged from 8 to 72 percent with a mean weight of 36 percent of the dry material. The ash of aquatic bryophytes that are free of sediment should be approximately 10 percent of the original dry weight (Brooks, 1972, p. 178). Thus, most samples contained various undetermined amounts of sediment.

Minus-80-mesh stream sediment samples and the nonmagnetic and moderately magnetic heavy-mineral-concentrate samples were analyzed semiquantitatively for 31 elements using a six-step emission spectrographic method outlined by Grimes and Marranzino (1968). The method was modified slightly for the concentrate samples to eliminate spectral interferences. Ash of aquatic-bryophyte samples was analyzed for 33 elements by a semiquantitative emission spectrographic method for plant materials described by Mosier (1972) and modified by Curry and others (1975). All of the analytical results are available in King and others (1980).

References cited

Brooks, R. R., 1972, Geobotany and biogeochemistry in mineral exploration: New York, Harper and Row, 290 p.

Curry, K. J., Cooley, E. F., and Dietrich, J. A., 1975, An automatic filter positioner device for emission spectroscopy: Applied Spectroscopy, v. 29, no. 3, p. 274-275.

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.

King, H. D., Risoli, D. A., Cooley, E. F., O'Leary, R. M., Speckman, W. A., Spiesman, D. L., Jr., and Galland, D. W., 1980, Final results and statistical summary of analyses of geochemical samples from the Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811F, 134 p.

King, H. D., Cooley, E. F., Gruzensky, A. L., and Spiesman, D. L., Jr., 1983a, Distribution and abundance of gold and silver in nonmagnetic and moderately magnetic heavy-mineral-concentrate and minus-80-mesh stream-sediment samples and silver in ash of aquatic bryophyte samples, Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811H.

King, H. D., Tripp, R. B., O'Leary, R. M., and Cooley, E. F., 1983b, Distribution and abundance of copper, lead, and zinc in nonmagnetic and moderately magnetic heavy-mineral-concentrate, minus-80-mesh stream-sediment, and ash of aquatic-bryophyte samples, Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811I.

King, H. D., Risoli, D. A., and Tripp, R. B., 1983c, Distribution and abundance of molybdenum, tin, and tungsten in nonmagnetic and moderately magnetic heavy-mineral-concentrate samples and tin in minus-80-mesh stream-sediment and ash of aquatic bryophyte samples, Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811J.

King, H. D., O'Leary, R. M., Risoli, D. A., and Galland, D. W., 1983d, Distribution and abundance of antimony and mercury in minus-80-mesh stream-sediment and antimony in nonmagnetic and moderately magnetic heavy-mineral-concentrate samples, Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811L.

Mosier, E. L., 1972, A method for semiquantitative spectrographic analysis of plant ash for use in biogeochemical and environmental studies: Applied Spectroscopy, v. 26, no. 6, p. 636-641.

Patton, W. W., Jr., Moll, E. J., Dutro, J. T., Jr., Silberman, M. L., and Chapman, R. M., 1980, Preliminary geologic map of the Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811A, 1 sheet, scale 1:250,000.

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

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

EXPLANATION OF SAMPLE-SITE SYMBOLS

SAMPLE SITES

- • Nonmagnetic and moderately magnetic heavy-mineral-concentrate samples.
- ○ Moderately magnetic heavy-mineral-concentrate samples
- + Nonmagnetic heavy-mineral-concentrate samples

DISTRIBUTION AND ABUNDANCE OF ARSENIC AND BISMUTH IN NONMAGNETIC AND MODERATELY MAGNETIC HEAVY-MINERAL-CONCENTRATE SAMPLES AND ARSENIC IN MINUS-80-MESH STREAM-SEDIMENT AND ASH OF AQUATIC-BRYOPHYTE SAMPLES, MEDFRA QUADRANGLE, ALASKA

By

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1983