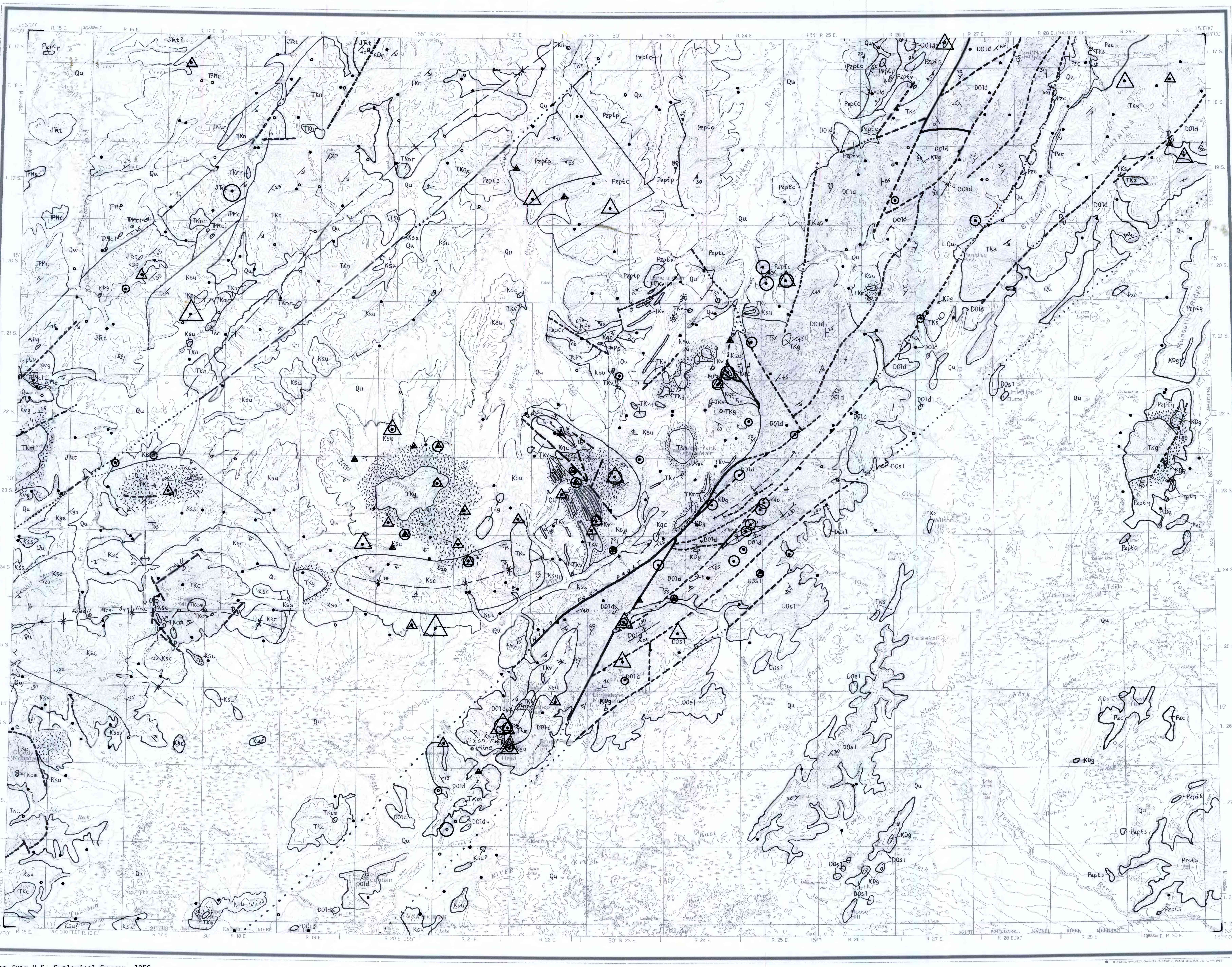
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



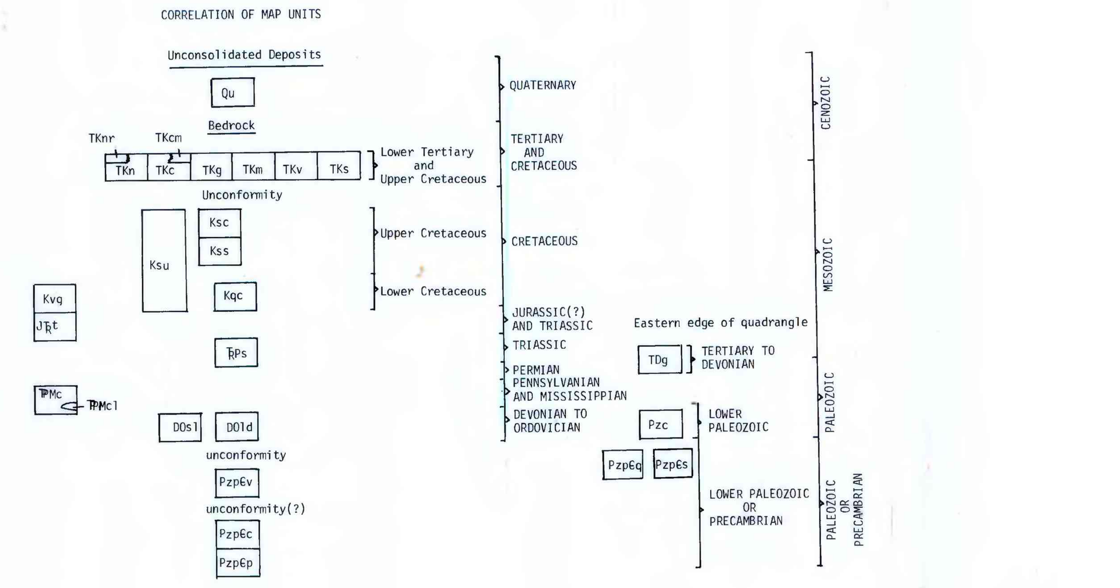
Base from U.S. Geological Survey, 1959

Geology generalized from Patton and others, 1980

SCALE 1:250000

CONTOUR INTERVAL 200 FEET
DOTTED LINES REPRESENT 100-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
1959 MAGNETIC DECLINATION AT SOUTH EDGE OF SHEET VARIES FROM 23°00' TO 24°30' EAST

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
TKm	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
JTRt	CHERTY TUFF, CRYSTAL AND LITHIC TUFFS, AND VOLCANIC BRECCIA
TRPs	SANDSTONE, SANDY LIMESTONE, SPICULITE, AND CONGLOMERATE
TPMc, TPMcl	CHERT AND LIMESTONE--Chiefly radiolarian chert. TPMcl--Limestone.
DOsl	SHALY LIMESTONE
DOld	LIMESTONE AND DOLOMITE
Pzc	CHERT AND PHYLLITE
Pzp€q	QUARTZITE, GRIT, AND ARGILLITE
Pzp€s	SHEARED GRIT, QUARTZITE, AND QUARTZ-MICA SCHIST
Pzp€v	METAVOLCANIC ROCKS--Metarhyolite and dacite
Pzp€c	CALC-SCHIST
Pzp€p	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

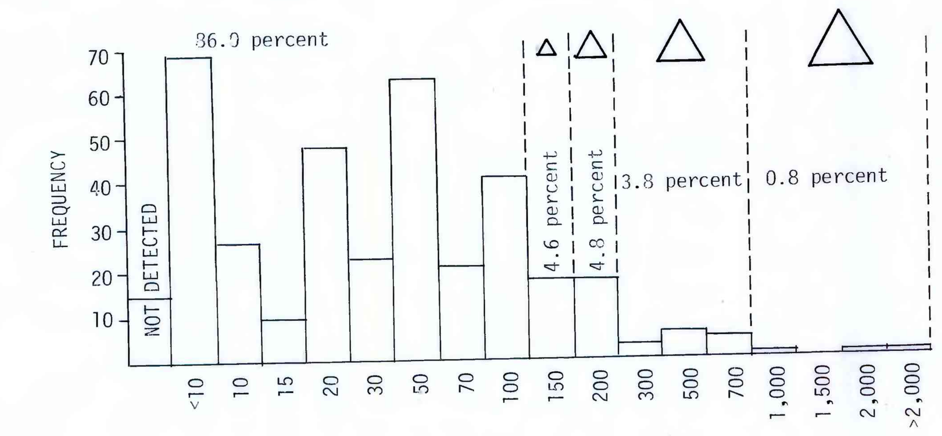
Strike of vertical beds

Horizontal beds

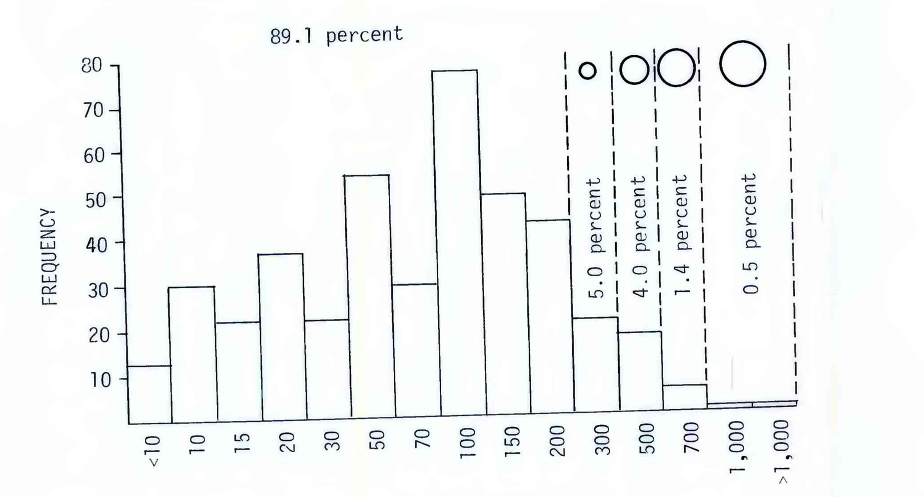
Strike and dip of beds based on photointerpretation or distant observation

Strike and dip of foliation

Zone of hornfels



Copper in nonmagnetic heavy-mineral-concentrate samples



Copper in moderately magnetic heavy-mineral-concentrate samples

Figure 1.--Histograms for copper in 370 nonmagnetic and 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.

COPPER 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 copper, lead, and zinc in 370 nonmagnetic (C3 fraction) and 422 moderately magnetic (C2 fraction) heavy-mineral-concentrate samples, in 513 minus-80-mesh stream-sediment samples, and in 355 ash of aquatic-bryophyte (mosses) samples, as indicated in the histograms (figures 1-6), 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 available in U.S. Geological Survey Open-File Reports (King and others, 1983a,b,c,d).

Symbols of different sizes are used to represent values and ranges of values as follows (also defined in the histograms, figures 1-6): Triangles denote copper, lead, and zinc in the C3 fraction and in mosses, and circles denote copper, lead, and zinc in the C2 fraction and in sediment samples on the respective maps. The largest symbols represent the highest values.

Symbols used to indicate sample sites and also to denote what types of samples were collected at the sites are small dots, circles, and crosses. Explanations for these symbols are given with each map.

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.

Maps showing all analytical values for copper, lead, and zinc in each of the four sample types were studied for indications of meaningful geochemical patterns. In selecting the values for plotting on the maps shown in this report, the low-concentration values with high frequencies showing widespread distribution with little evidence of clustering were excluded. The lowest values plotted on the maps were considered to show distribution patterns wherein in some area or areas a cluster or other meaningful pattern is present that may represent a poorly-exposed mineral deposit and the values are considered anomalous in that area. Elsewhere the lower values may be located in areas of clusters of higher values and help in delineating anomalous areas. Widely scattered low values are not considered anomalous.

SAMPLING, PREPARATION, AND ANALYSIS OF SAMPLES

Most of the samples were taken from channels of active streams with upstream catchment areas averaging about nine km^2. 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. Minus-80-mesh stream-sediment samples were also analyzed for zinc using the atomic absorption method described by Ward and others (1969). Ash of quatic-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 U.S. Geological Survey Open-File Report 80-811 F (King and others, 1980).

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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 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

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