DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-2071-C
PAMPHLET

MINERALOGICAL MAPS SHOWING THE DISTRIBUTION AND ABUNDANCE OF SELECTED MINERALS IN NONMAGNETIC HEAVY-MINERAL-CONCENTRATE SAMPLES FROM STREAM SEDIMENT, SOLOMON AND BENDELEBEN 1° x 3° QUADRANGLES, SEWARD PENINSULA, ALASKA

By

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INTRODUCTION

The USGS (U.S. Geological Survey) is required by ANILCA (Alaska National Interest Lands Conservation Act, Public Law 96-487, 1980) to survey certain Federal lands in Alaska to determine their mineral resource potential. A reconnaissance geochemical survey of the Solomon and Bendeleben 1° x 3° quadrangles, an area of about 22,300 km^2 on the Seward Peninsula, west-central Alaska, was conducted from 1981 to 1983 as part of AMRAP (Alaska Mineral Resource Assessment Program). Stream-sediment samples and nonmagnetic heavy-mineral-concentrate samples derived from stream sediment were collected and analyzed for 31 elements. The mineralogy of the nonmagnetic heavy-mineral concentrates was also determined. This report presents mineralogical maps and histograms showing the distribution and abundance of selected minerals in the nonmagnetic heavy-mineral concentrates. Geochemical maps and histograms showing the distribution and abundance of selected elements in the stream-sediment samples and in the nonmagnetic heavy-mineral concentrates are given in Smith and others (1989) and in King and others (1989), respectively. A report on the interpretation of these data is in progress by S.C. Smith and H.D. King.

SAMPLE COLLECTION, PREPARATION, AND ANALYSIS

Nonmagnetic heavy-mineral-concentrate samples were collected at 1,400 sites, all of which were also stream-sediment-sample sites. The heavy-mineral-concentrate samples were derived from active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order streams) streams as shown on USGS topographic maps at 1:63,360 scale. The area of the drainage basins sampled averaged about 12 km^2 and ranged from about 1 to 120 km^2. Samples were generally composited from several localities along a stretch of stream channel as long as 8 m. Stream sediments were sieved at the sample sites with a 2-mm (10-mesh) stainless-steel screen and the finer part was panned using a 14-in. gold pan.

Samples were air dried in the field; some samples were further dried in an oven at the laboratory. The panned samples were sieved with a 0.84-mm (20-mesh) screen. The finer fraction was passed through bromoform (specific gravity 2.8) to remove light-weight mineral grains not removed in the panning process. The resultant heavy-mineral sample was separated into three fractions using a large electromagnet, in this case a modified Frantz Isodynamic Separator. The magnetic separates are the same separates that would be produced by using a Frantz Isodynamic Separator set at a forward slope of 5° and a side slope of 10°, with a current of 0.1 ampere to remove the most magnetic fraction and a current of 0.7 ampere to split the remainder of the sample into an intermediately magnetic fraction and a relatively nonmagnetic fraction. The fraction containing the most magnetic material, primarily magnetite, and the intermediate fraction, consisting largely of ferromagnesian silicates and iron oxides, were not analyzed. The least magnetic fraction was split into two parts using a microsplitter. One split was used to determine the mineralogy of the nonmagnetic heavy-mineral concentrates. The other split was ground for spectrographic analysis.

The mineralogical content of the nonmagnetic heavy-mineral concentrates was determined using a binocular microscope and a short-wave ultraviolet light. X-ray diffraction was used to confirm some mineral species. This analysis helps to determine the minerals associated with geochemical anomalies; although in some cases, trace amounts of minerals are missed. Mineralogical analysis is also used to identify man-made contaminants such as bullets, weld fragments, and so forth. The mineralogy was determined by Scott Werschky. Richard B. Tripp was a consultant.

The mineralogical data have been entered in the USGS's computerized RASS (rock analysis storage system). Data reduction was done on a Data General MV/6000 computer using the USGS's STATPAC package. STATPAC programs perform numerous functions including map generation, data tabulation, data editing, and statistics (VanTrump and Miesch, 1976).

MINERALOGICAL MAPS

Two mineralogical maps, each on a geologic and a topographic base, show the spatial distribution and abundance of galena, pyrite, and tourmaline (map A) and of cassiterite, gold, and scheelite (map B). The minerals are displayed in a radial pattern on maps A and B. As many as three concentration intervals are exhibited for each mineral. The radial pattern and concentration intervals of each mineral are explained in the legend.

Histograms for each mineral on the maps are exhibited on figures 1 and 2. These histograms illustrate the range of the data for each mineral.

REFERENCES CITED

King, H.D., Smith, S.C., Sutley, S.J., and Greene, K.R., 1989, Geochemical maps showing the distribution and abundance of selected elements in nonmagnetic heavy-mineral-concentrate samples from stream sediment, Solomon and Bendeleben 1° x 3° quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-2071-B, scale 1:250,000.

Smith, S.C., King, H.D., and O'Leary, R.M., 1989, Geochemical maps showing the distribution and abundance of selected elements in stream-sediment samples, Solomon and Bendeleben 1° x 3° quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-2071-A, scale 1:250,000.

Till, A.B., Dumoulin, J.A., Gamble, B.M., Kaufman, D.S., and Carroll, P.I., 1986, Preliminary geologic map and fossil data, Solomon, Bendeleben, and southern Kotzebue quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Open-File Report 86-276, scale 1:250,000.

VanTrump, George, Jr., and Miesch, A.T., 1977, The U.S. Geological Survey RASS-STATPAC system for management and statistical reduction of geochemical data: Computers and Geosciences, v. 3, p. 475-488.

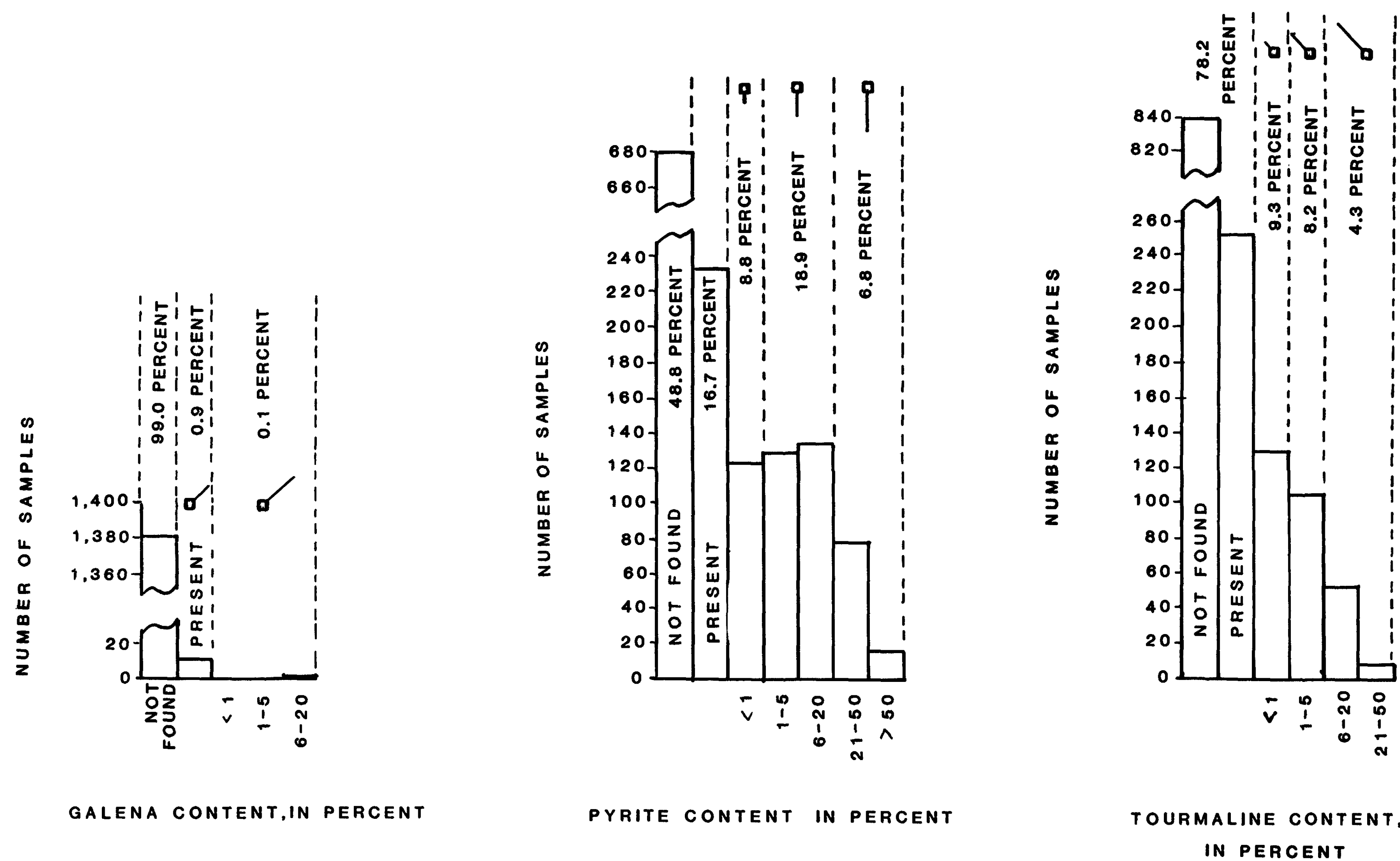

Figure 1.--Histograms showing amounts of galena, pyrite, and tourmaline in nonmagnetic heavy-mineral-concentrate samples from stream sediment, Solomon and Bendeleben 1° x 3° quadrangles. Symbols (star-diagram rays), which vary in length to denote amounts of minerals present, correspond to symbols used on map A.

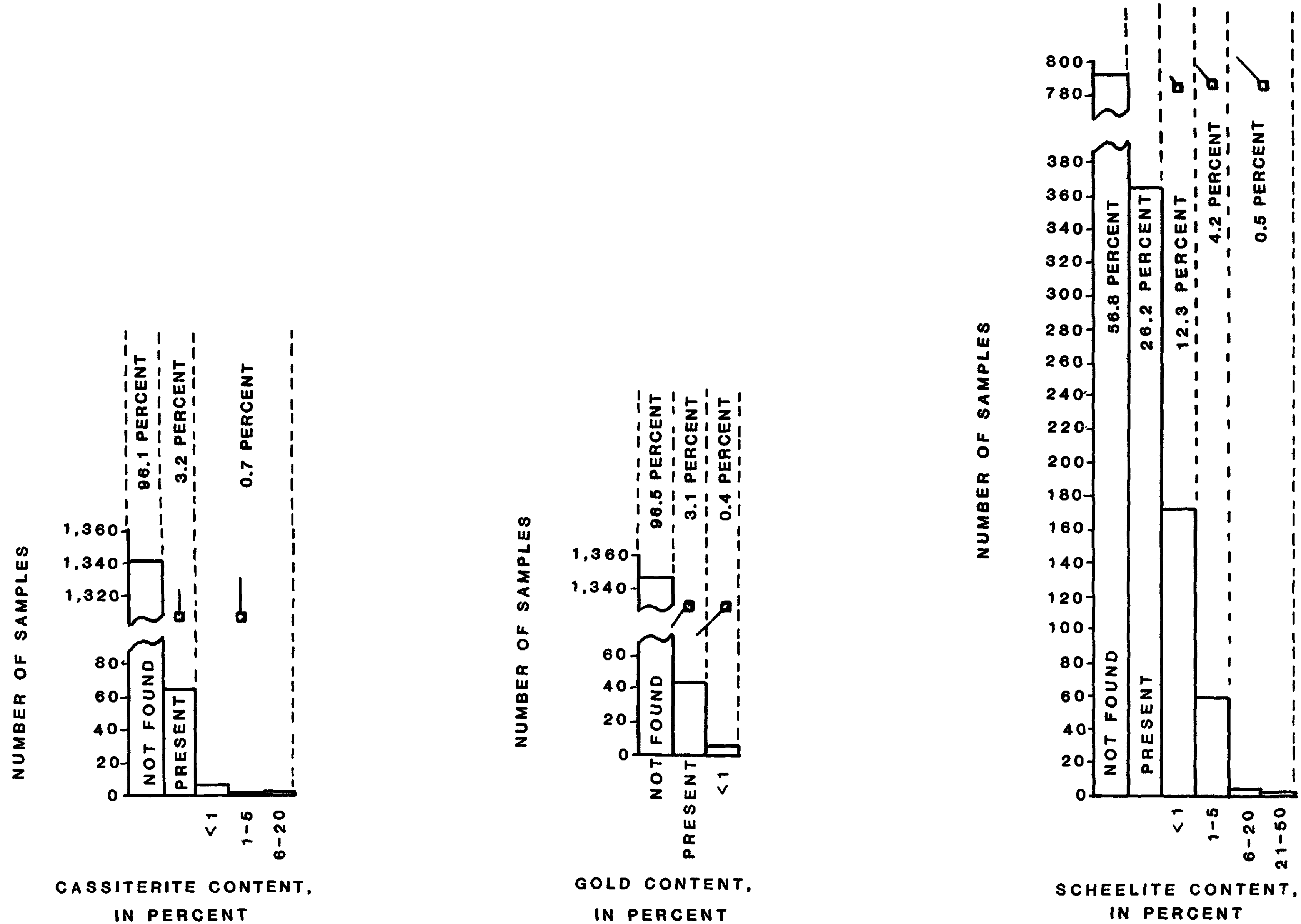

Figure 2.--Histograms showing amounts of cassiterite, gold, and scheelite in nonmagnetic heavy-mineral-concentrate samples from stream sediment, Solomon and Bendeleben 1° x 3° quadrangles. Symbols (star-diagram rays), which vary in length to denote amounts of minerals present, correspond to symbols used on map B