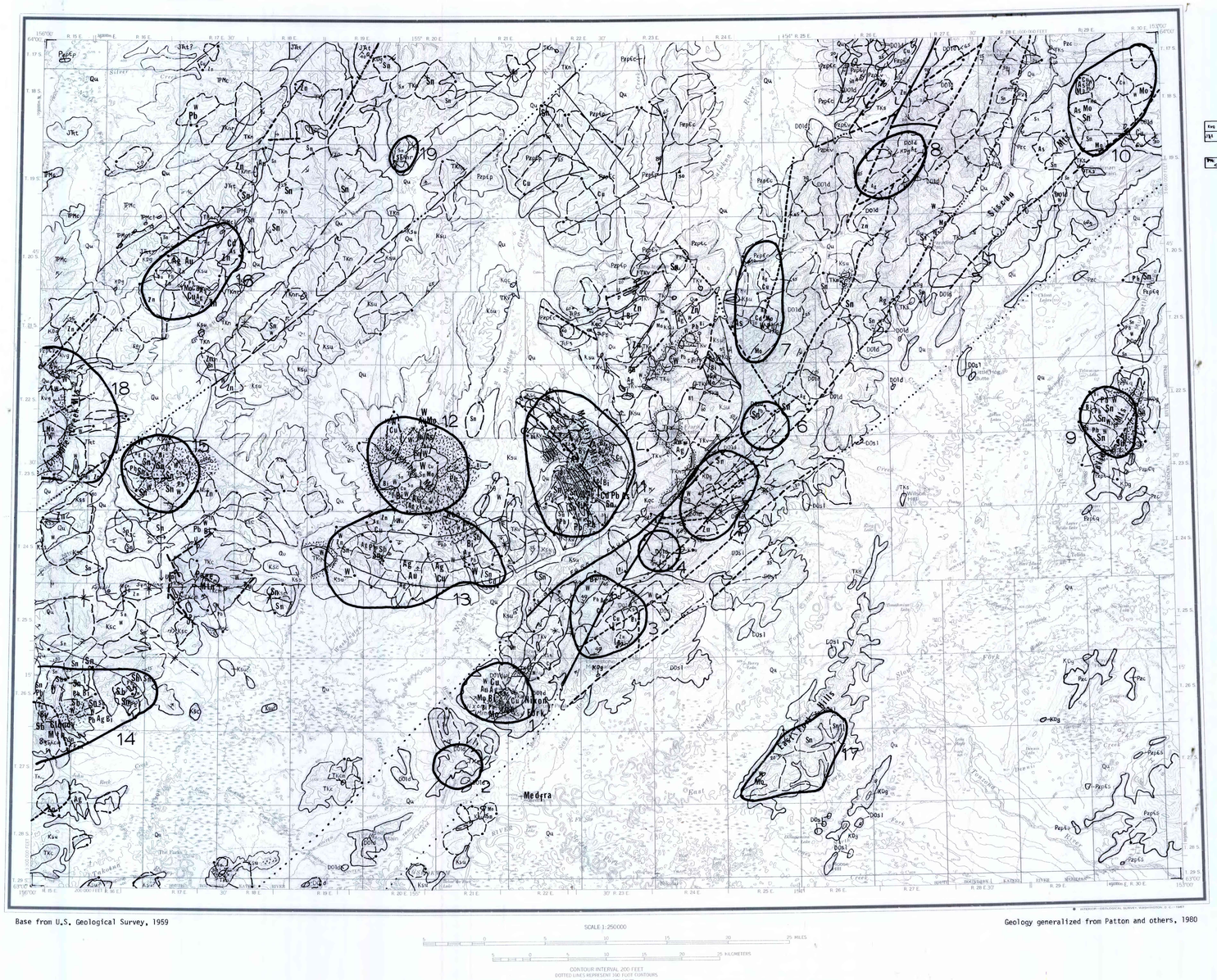

Figure A.— SELECTED ELEMENTS IN NONMAGNETIC HEAVY-MINERAL-CONCENTRATES SAMPLES

DISCUSSION

Introduction

These maps are part of a folio of maps for the Medfra quadrangle, Alaska, compiled as part of the Alaska Mineral Resource Assessment Program. They show the distribution and abundance, on a screened topographic and geologic base, of antimony, arsenic, bismuth, cadmium, copper, gold, lead, molybdenum, silver, tin, tungsten, and zinc in two fractions of heavy-mineral concentrates, a nonmagnetic fraction (C3 fraction), and a moderately magnetic fraction (C2 fraction), minus-80-mesh stream-sediment, and one of aquatic bryophytes (see table 1, below).

Table 1.--Elements plotted for the four different sample media

	Ag	As	Au	Bi	Cd	Cu	Mg	Mo	Pb	Sb	Sn	W	Zn
Nonmagnetic heavy-mineral-concentrate samples	X	X	X	X	X	X		X	X	X	X	X	X
Moderately magnetic heavy-mineral concentrate samples	X	X	X	X	X	X		X	X	X	X	X	X
Minus-80-mesh stream-sediment samples	X	X				X		X	X	X			X
Ash of aquatic bryophytes samples	X	X				X	X	X					X

Symbols for elements are shown in different sizes of lettering to represent analytical values or ranges of values defined in the histograms (figures 1-4). The symbols are shown within or adjacent to the upstream catchment areas of the streams from which the samples were collected. The approximate boundaries of the catchment areas, as well as roads, trails, lines and sample-collection sites are shown on small dots.

The investigation has shown a number of geochemical anomalies--departures from normal geochemical patterns--in the Medfra quadrangle, based on subjective interpretation. Nineteen areas of geochemical anomalies are described in this report. The general outlines of the areas are shown on each map.

Sample Media

The four sample types, <0.177 mm fraction of stream sediments, C3 and C2 fractions of heavy-mineral concentrates of stream sediment, and ash of aquatic bryophytes, provide a wide range of data and supplementary information. Most of the anomalous areas described in this report were more completely outlined by data obtained from a combination of the media rather than from one sample medium alone.

The C3 fraction of heavy-mineral concentrates obtained from nearly all of the sample sites, is comprised chiefly of a composite of ultrabasic and also of chemically decomposed hornblende as well as organic matter. For the Medfra quadrangle there is a good possibility that material of similar origin (Black, 1964) that does not represent local bedrock may be present in the samples. Such material may explain a large percentage of the anomalous results for this sample medium. Limonite may become strongly enriched in certain elements including lead, copper, and silver, and to a lesser extent, zinc, and also anions of arsenic and molybdenum by adsorption.

The aquatic bryophytes have the ability to absorb and accumulate elements in solution in streams (Brooks, 1972); they may also be affected by entrapment of heavy-mineral grains. Samples of this material provide data on data primarily related to dissolved elements and, as described in the next section, an attempt was made to remove all mineral grains. The results suggest however that both mechanisms, absorption and entrapment, provided useful information for locating and outlining anomalous areas.

Sampling Preparation and Analysis of Samples

Most of the samples were taken from active channels of streams with gravel-cobble-sand areas averaging about 20 m wide. Samples were taken from accumulations of gravel or sand bars whenever possible but where sites were not available because of helicopter landing problems, larger, or third order, streams were sampled.

Stream sediments were wet sieved at the sample sites with a stainless-steel screen to obtain the material finer than 0.177 mm (80-mesh). An attempt was made at each site to fill the pan; however, at many sites fine sediment was not readily available and only various lesser amounts were obtained. A sample of the C2-mm sediment was taken from the pan for the stream-sediment sample and subsequently screened through a 0.177-mm (80-mesh) sieve to remove most of the finer material fraction and obtain a heavy-mineral concentrate.

Samples of aquatic bryophytes were collected from beneath the water level on the silty sides of stream channels, as well as from deadwood and boulders where the bryophytes were attached. Samples were partially washed with water to remove most of the adhering 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 base camp. After drying, the stream-sediment samples were sieved through a 0.177-mm (80-mesh) screen; the coarser fraction was pulverized to minus 150 mesh in a vertical grinder using ceramic grinding plates. Panned samples were sieved with a 20-mesh (0.841 mm) screen. The <20-mesh fraction was passed through electrostatic and magnetic separators. The non-magnetic mineral grains not removed by the panning process, and the heavy-mineral concentrate sample was then divided into three fractions based on the magnetic susceptibilities of the mineral grains. A fraction resisting clinging of magnetite was removed with a hand magnet and a Frantz isodynamic magnetic separator (forward slope, 5°; side slope, 10°). Two additional fractions were obtained from the remaining material by passing the material through the separator; the fraction composed of minerals separated magnetically at an amperage of greater than 0.6 ampere is referred to as nonmagnetic (C3 fraction); the fraction with minerals magnetic between 0.2 and 0.6 ampere is called moderately magnetic (C2 fraction).

The C3 fraction of heavy-mineral concentrates normally contains most minerals of interest in geochemical exploration for ore deposits. Analysis of this fraction provides the most sensitive geochemical data to help locate mineralized areas. Identification of specific minerals in the C3 fraction by microscopic examination and, where necessary, by x-ray diffraction, can provide information useful in determining the type of deposit or mineralization present.

The C2 fraction of the heavy-mineral concentrate contains most of the iron-formation minerals and various amphiboles of iron and manganese. Because the composition of heavy mineals varies there are variations in magnetic susceptibility as well. Ore minerals might also be included in the C2 fraction because of intergrowths with minerals with greater magnetic susceptibility. The mineral fraction of greater magnetic susceptibility in the C2 fraction may explain a large percentage of the anomalous results for this sample medium. Limonite may become strongly enriched in certain elements including lead, copper, and silver, and to a lesser extent, zinc, and also anions of arsenic and molybdenum by adsorption.

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The mineralogic composition of the nonmagnetic fraction was visually determined with a binocular microscope. Using a microsplitter, a split of each sample was ground in a mortar and pestle. One split was then pulverized to <150 mesh by hand grinding with a mortar and pestle. The ground portion was used for spectrographic analysis.

Most, but not all, remaining silt and sand was removed from the oven-dried panned concentrate and compressed air, followed by several rinses with acetone, was used to remove the remaining silt. The pulverized material was placed in a muffle furnace for 24 hours at a maximum temperature of 500°C, after which the ash was passed through a 0.149-mm sieve (100 mesh), which removed most remaining sand grains. The ash of the sieved material was then weighed to the nearest mg. The ash weight of the dry material. The ash weight of bryophytes that are free of sediment should be approximately 5 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 ash of bryophytes were analyzed by semiquantitative spectrographic methods for 31 elements using a six-step emission spectrographic method (Grimes and Marranzino, 1968). The method was modified slightly for the concentrate samples to eliminate spectral interferences. Stream-sediment samples were also analyzed for gold, mercury, and 5 other elements by methods described by Ward and others, 1969). Ash of aquatic bryophyte samples were analyzed for 31 elements by a semi-quantitative 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 80-811M (King and others, 1980).

Anomalous Area 1

Several anomalous areas are located in the belt of Early Paleozoic(?) metamorphic rocks that extends diagonally across the quadrangle from Halfway Mountain, west of Medfra, to near Nowitna Mountain in the northeast corner of the quadrangle. There is an area (Ag, Au, Cu, Zn anomalies) in the C3 fraction (pl. 21 and 26 C.) where an estimated 40,000 to 60,000 cu yd has been produced from small contact metamorphic lode deposits localized in limestone near a quartz monzonite intrusion (Berg and Cobb, 1967, p. 96). Highest values in the area are from two lobes on upper Ruby Creek near which there have been drilling operations. The anomalous results in this area are undoubtedly enriched by contamination. Samples from other streams in the Nixon Fork area, particularly Hawk Creek, taken downstream from known deposits, gave only low to moderately anomalous results (see Horvath, 1966, p. 16-17 for a possible explanation), suggesting that few values for adjacent areas may not necessarily indicate any mineral resource potential.

Anomalous Area 2

An anomaly is indicated in the area of the Stone mine (Ag, Au, Cu, Pb, Zn in the C3 fraction, pl. 21 and 26 C.) in the Sischu River drainage, north and east of White Mountain Creek, and is underlain in the southern half by Early Paleozoic(?) metamorphosed rocks. Limestone and dolomite of the carbonate belt. The source of the area is underlain by early Paleozoic or Precambrian calc-schist (Patton, 1967). Carbonate rocks are intruded by a Cretaceous or early Tertiary quartz monzonite stock (Tkg) and is anomalous in Ag, Au, Cd, Cu, Mo, Pb, and Zn in the C3 fraction, and Ag, Cu, Mo, Pb, and Zn in the C2 fraction. Ag, and Pb in sediment. A small contact-metamorphic magnetite deposit was discovered during 1976 (Throckmorton and Patton, 1978) at the contact of the quartz monzonite stock with the limestone and dolomite. A sample from share at the contact contained anomalous Mo and a sample of contact metamorphosed limestone from the prospect contained anomalous Ag and Mo. To north of the magnetite deposit contained anomalous Ag, Au, Bi, Cu, Pb, Sb, and Zn (Schwab and others, 1981). Arsenopyrite, chalcopyrite, galena, powellite, pyrite, and scheelite were identified in C3 samples from the area.

Anomalous Area 3

An anomalous area occurs between 11 and 22 km from the Nixon Fork area to the northeast and in the carbonate belt (T. 25 S., R. 23 E.). The area is defined by anomalous Ag, Bi, Cu, Mo, W, and Zn in the C3 fraction, Ag, Cu, Mo, Pb, and Zn in the C2 fraction, Mg, and Zn in sediment, and Cu, and Zn in moss. Chalcopyrite, cinnabar, malachite, and galena were identified in C3 samples from the area. Scheelite introduced by tilling (also or still), too small to be shown on the geologic map, is located in this area, and on the basis of aeromagnetic interpretation (Patton and others, 1980) another mafic intrusive body is suggestedland. The anomalous results are related, in part, to mineralization in the contact of these intrusive bodies and the carbonate rocks which is supported by Schwab and others (1981) who reported anomalous values in rock samples from the contact zone.

Anomalous Area 4

Farther northeast, a smaller area (T. 24 S., R. 23 E.) is anomalous in Ag, Pb, and Zn in the C3 fraction, Cu, Mo, Pb, and Zn in the C2 fraction, and Mg, and Zn in sediment. Sphalerite was noted in the C3 fraction. A sample of iron oxide gossan in carbonate rock from this area contained 350,000 ppm Zn and 900 ppm Pb (Schwab and others, 1981).

Anomalous Area 5

Another area (T. 23 and 24 S., R. 24 E.) in the carbonate belt is located between Halfway and Nowitna Mountains, is drained by Whitehand and Sischu Creek, and is anomalous in Ag, Cu, Mo, Pb, and Zn in the C3 fraction. This area is characterized by anomalous elements in the C2 fraction that include Ag, Cu, Mo, Pb, and Zn. Sediments in the area contain W and Zn in the C3 fraction, Ag, and Zn in sediment, and Zn anomalous moss. Sphalerite and galena were identified in the C3 fraction. Chalcopyrite was also identified. It is noted that C2 samples from this area contained unusually large amounts of iron oxides, which are possibly derived from gossans. Schwab and others (1981) sampled one gossan in limestone and dolomite in this area and obtained high values for Cu, Hg, Pb, and Zn. They also identified anomalous Ag, Cu, Pb, Mo, and Zn for a sample of chert conglomerate with hematite veinlets.

Anomalous Area 6

A southeast area is located (T. 22 S., R. 25 E.) a short distance northeast of Era S. This area is anomalous for antimony, Ag, Cu, Mo, Pb, and Zn in moss, Ag, Mo, and Pb in the C2 fraction, and Cu and Pb in the C3 fraction. The intersection of northeast- and northwest-trending high angle faults (inferred) is adjacent to the area.

Anomalous Area 7

This area is located (T. 20 and 21 S., R. 24 and 25 E.) in the Sischu River drainage, north and east of White Mountain Creek, and is underlain in the southern half by Early Paleozoic(?) metamorphosed rocks. Limestone and dolomite of the carbonate belt. The source of the area is underlain by early Paleozoic or Precambrian calc-schist (Patton, 1967). Carbonate rocks are intruded by a Cretaceous or early Tertiary quartz monzonite stock (Tkg) and is anomalous in Ag, Au, Cd, Cu, Mo, Pb, and W in the C3 fraction, Ag, Cu, Mo, Pb, and Zn in the C2 fraction, Ag, and Pb in sediment. A small contact-metamorphic magnetite deposit was discovered during 1976 (Throckmorton and Patton, 1978) at the contact of the quartz monzonite stock with the limestone and dolomite. A sample from share at the contact contained anomalous Mo and a sample of contact metamorphosed limestone from the prospect contained anomalous Ag and Mo. To north of the magnetite deposit contained anomalous Ag, Au, Bi, Cu, Pb, Sb, and Zn (Schwab and others, 1981). Arsenopyrite, chalcopyrite, galena, powellite, pyrite, and scheelite were identified in C3 samples from the area.

Anomalous Area 8

An anomalous area, in the carbonate belt, that is only conspicuous in the C2 fraction is located west of the Sischu Mountains near the northeast corner of the quadrangle (T. 19 S., R. 26 E.). Highest values in the C2 fraction are for Mo. Other anomalous elements include Ag, Au, Cu, and Zn in the C2 fraction and Zn in the C3 fraction and moss. The area is transected by a northeast-trending high-angle fault (inferred). No pre or one-related minerals were found in C3 samples and no indicators of mineralization were reported for the area by Schwab and others (1981). A possible explanation for the anomaly may be mineralization along the contact between the limestone and dolomite and a narrow northeast-trending gabbro dike, which was reported by Patton and others (1980 p. 6).

Anomalous Area 9

The anomalous area outlined is in the Telida Mountains, where gneiss, schist, gneiss, and argillite (Pzpq) are intruded by a granitic pluton (Tkg) and altered to hornfels over a wide area. Samples from streams draining mainly areas of the granite contained most of the anomalous values. Sn and Zn (not shown) are highly anomalous in all of the sample media.

Other anomalous elements include Bi, Mo, and W in the C3 fraction, Bi in the C2 fraction, Ag in sediment, and Ag, Cu, and Zn in moss. Cassiterite was identified in C3 samples. The C3 samples also contained scheelite (CaWO$_4$) and cinnabar (HgS) was identified in one sample. Schwab and others (1981) noted an abundance of tourmaline in both the granite and the surrounding rocks. The gangue minerals, and geochemical results suggest a relation to the Tertiary tin-tungsten deposits (see tin-tungsten zone of Reed, 1980).

Anomalous Area 10

An anomalous area is located in the Sischu Mountains in the northeast corner of the quadrangle. In the Sischu Mountains area, Paleozoic carbonate rocks are intruded by a Cretaceous(?) granite porphyry exposed Late Cretaceous and early Tertiary rhyolite and dacite flows and domes, locally containing interlayered tuffs and breccia, (Tkv). The volcanic rocks are cut by a Tertiary granite (Tkg) and are altered to hornfels in the vicinity of the contact. The strongest anomalies in the northwest and northeastern parts of the area; elsewhere in the area anomalous values are scattered. The anomaly is characterized by Ag, Cu, Mo, Pb, and Zn in the C3 fraction, Ag, Cu, Mo, and Zn in the C2 fraction, and Ag, and Zn in sediment. Cassiterite was identified in the C3 fraction. The area is anomalous in Ag, Cu, Mo, Pb, Sn, and Zn in the C3 fraction, Ag, Cu, Mo, Pb, and Zn in the C2 fraction, and Ag, and Zn in sediment. Cassiterite was found in about one-half, probably accounting for most of the Sn values in the C3 fraction. Samples in the C3 fraction with high Ag values also contained anomalous Pb and Zn. Samples with the highest Cu values also contained anomalous Mo and Zn. Samples with the highest Mo value also contained anomalous Cu and Zn. The Mo value is most often formed by the alteration of molybdenite, and gold were observed in a sample (C3 fraction) that also contained high Mo and Au values. A sample (C3 fraction) from Lost Water Creek with 2,000 ppm Sn (Schwab and others, 1981) could have as its source a vein or pegmatite in the granite porphyry.

Anomalous thorium (not shown) was also detected in several samples in the C3 and C2 fractions; this Th may occur in the mineral monazite which was identified in several samples (C3 fraction). Uranophorite may also be present. Anomalous U (not shown) was detected in several samples. Lowe (unpublished data, 1979) reported anomalous U in the Sischu and Nixon Fork and Gulch areas of the same streams in the southern part of the Sischu Mountains and suggested (p. 23) that the area could be further examined for uranium deposits.

Anomalous Area 13

The large area south of the Sunshine Mountains contains several anomalies and is distinguished from the main Sunshine Mountains area by the occurrence of highly-anomalous Hg in sediment and Sb in the C3 fraction. Other elements associated in the suite include Ag, As, Au, Bi, Cd, Cu, Pb, Sn, W, and Zn in the C3 fraction; Ag, Au, Bi, Cu, Mo, W, and Zn in the C2 fraction; Ag, Cu, Pb, and Zn in sediment; and Ag, As, and Zn in moss. The elemental enrichments in the C3 fraction are related to cassiterite, cinnabar, scheelite, and pyrite, which were identified in several samples and arsenopyrite, gold, chalcopyrite, and powellite, which were identified in one or two samples in the C3 fraction.

The area is underlain mainly by Cretaceous sedimentary rocks (Ksu, Ksc) which in the contact are altered to hornfels. The hornfels suggest that the granite pluton (Tkg) underlies the area. Cassiterite was found on Cottonwood Creek and on an outcrop of an unidentified silver mineral with galena in the southern part of the Mystery Mountains. Anomalous Cu in the area of the Cottonwood Creek drainage, included chiefly by stud fluxes in sediment and moss, probably reflects copper occurrences described by Patton (unpublished data, 1980) and consists locally enriched in chalcopyrite (Schwab and others, 1981).

Several small anomalies are located in the area between the Mystery Mountains and White Mountain Creek. Some high values were found in samples draining from Frank Mountain, a granitic pluton (Tkv), and in samples from a belt of Upper Cretaceous sedimentary rocks (Ksu) to northeast. An anomalous area northeast of Von Frank Mountain is underlain by rock units that include carbonate rocks (T Pz). Anomalous elements include Bi, Cu, Mo, and W in the C3 fraction, Ag, Bi, Cu, Mo, and Zn in the C2 fraction, and Cu and Zn in sediment. The sample from the C3 fraction contained scheelite and cassiterite in the C3 fraction, possibly derived from some mineralization in carbonate rocks near a granitic pluton (Tkg) outcropping nearby. In the anomalous area north of Von Frank Mountain, anomalies appear related to granitic plutons (Tkg) or possibly to small plugs or domes of rhyolite and dacite (Tkv), that are exposed in the area.

Anomalous Area 12

Anomalies in the Sunshine Mountains probably result from mineralization in the contact area of the large granitic pluton (Tkg) that underlies the core of the mountains, and Cretaceous tertiryonous sedimentary rocks (Ksu), which are altered to hornfels over a broad area outward from the contact. Anomalous elements include Ag, Bi, Cu, Mo, Pb, Sn, and W in the C3 fraction, Au, Cu, Sn, and W in the C2 fraction, Ag, Cu, Mo, Pb, Sn, and Zn in sediment, and Sn and Zn in moss. Cassiterite was found in about one-half, probably accounting for most of the Sn values in the C3 fraction. Samples in the C3 fraction with high Ag values also contained anomalous Pb and Zn. Samples with the highest Cu values also contained anomalous Mo and Zn. Samples with the highest Mo value also contained anomalous Cu and Zn. The Mo value is most often formed by the alteration of molybdenite, and gold were observed in a sample (C3 fraction) that also contained high Mo and Au values. A sample (C3 fraction) from Lost Water Creek with 2,000 ppm Sn (Schwab and others, 1981) could have as its source a vein or pegmatite in the granite porphyry.

Anomalous thorium (not shown) was also detected in several samples in the C3 and C2 fractions; this Th may occur in the mineral monazite which was identified in several samples (C3 fraction). Uranophorite may also be present. Anomalous U (not shown) was detected in several samples. Lowe (unpublished data, 1979) reported anomalous U in the Sischu and Nixon Fork and Gulch areas of the same streams in the southern part of the Sischu Mountains and suggested (p. 23) that the area could be further examined for uranium deposits.

Anomalous Area 13

Anomalous elements for the area include Ag, As, Au, Cd, Cu, Mo, Pb, and Zn in the C3 fraction, Ag, and W in the C2 fraction, and Sn in sediment. High values of Au, Cu, Pb, and Zn in a C3 sample from the southeast part of the area are derived from arsenopyrite, chalcopyrite, galena, and scheelite, respectively, which were identified in one or two samples from an adjoining drainage to the northwest. High Au in this sample probably reflects silver occurring as an alloy with the gold. Sphalerite was found in two C3 samples (C3 fraction) with anomalous Zn. Four C3 samples contained pyrite. Cassiterite, scheelite, and powellite were identified in a few of the C3 samples. Hydrothermal vein deposits are suggested by the mineral assemblage.

Anomalous Area 17

A high-anomalous gold value (10 ppm) was found in a sediment sample from a stream draining the southeast side of the East Fork Hills. The value is considered questionable (Schwab and others, 1981; p. 71), however, other evidence suggests mineralization has taken place in the area. The East Fork Hills are underlain by Devonian to Middle Devonian (?) metamorphosed rocks (Patton and others, 1980) of gabbro (Dg) (Patton and others, 1980). Other anomalous elements in the East Fork Hills are Mo, Sn, and W in the C3 fraction, Sn in the C2 fraction, Hg, W in sediment, and Ag in moss. Minerals found in the C3 fraction from the area include cassiterite, powellite, and scheelite. The anomalous results could be related to mineralization in the intrusion along contact zones between gabbro and limestone.

Anomalous Area 18

Anomalous results were obtained for samples from various sites in the Cripple Creek Mountains, a placer gold mining area, at the west-central border of the quadrangle. These include Ag, Bi, Cd, Mo, and Sn in the C3 fraction, W and Sn in the C2 fraction, Au, Cu, Hg, Pb, and Zn in sediment, and Ag, and Zn in moss. Minerals found in the C3 fraction include gold, pyrite, cinnabar, cassiterite, and scheelite. The source of the anomalies is a Tertiary granite porphyry (Tgp) and the mineral gold, found on Coloradoo Creek, probably does not represent any significant economic mineralization. Other anomalous results are probably related to mineralization that occurred in the intruded rocks along the contact with the monzonite plutonic of the Cripple Creek Mountains.

Anomalous Area 19

An anomaly of Sb and Sn in the C3 fraction is located in the area of the Sischulina River (T. 19 S., R. 21 E.). Antimony (1) is the only element with the Nowitna River. Bedrock trace-element anomalies, mineralization, and alteration have been described in this area (Schwab and others, 1981; Silberman and others, 1983) in a rhyolite flow-dome in volcanic rocks of the Nowitna River area (Tbrv).

Summary

The results of this geochemical survey reveal the presence of a number of geochemical anomalies in the Medfra quadrangle. Interpretation of the results provide supplementary information for outlining the mineral potential of the quadrangle. Between of the most conspicuous areas are those that provide information pertaining to element suites, mineral assemblages, and geologic settings as well as mineral resources. This information together with other reports and maps provide a basis for the interpretation of the mineral resource potential of the Medfra quadrangle.

References cited

Berg, H. C., and Cobb, E. H., 1967, Metalliferous lode deposits of Alaska: U.S. Geological Survey Bulletin 783.

Black, R. F., 1964, Eolian deposits of Alaska: Arctic, v. 17, pp. 89-113.

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

Cohn, C. E., 1970, compiler, Antimony occurrences in Alaska: U.S. Geological Survey Mineral Investigations Resources Map MR-62.

Eberlein, G. D., Chapman, R. M., Foster, H. L., and Gassaway, J. S., 1976, Geology and cinnabar-stibnite deposits and selected metalliferous and nonmetallic occurrences in central Alaska: U.S. Geological Survey Open-File Report 77-168-D.

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.

Herreros, Ricardo, 1966, Geology and geochemistry of the Nixon Fork area, Medfra quadrangle, Alaska: Alaska Division of Mines and Minerals-Geologic Report no. 27, 1 p.

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

Lindsey, D. A., and Shawe, D. R., 1982, Tungsten-bearing skarn deposits, in Erickson, R. L., compiler, Descriptions of selected precious-metal deposits: U.S. Geological Survey Open-File Report 82-795, p. 67-69.

Mosier, E. L., 1972, A method for semiquantitative spectrographic analysis of ashed plant tissue in biogeochemical and ecological studies: U.S. Geological Survey Circular 651, 7p, no. 6, p. 436-441.

Patton, W. W. Jr., Moll, E. J., Cobra, 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 80-811, scale 1:250,000.

Reed, B. L., 1980, Tin-tungsten skarns, in Erickson, R. L., compiler, Characteristics of mineral deposit occurrences: U.S. Geological Survey Open-File Report 82-795, p. 59-61.

Schwab, C. E., Patton, W. W. Jr., and Moll, E. J., 1981, Mineral occurrence map of the Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 80-811-H, 2 sheets, 39 p.

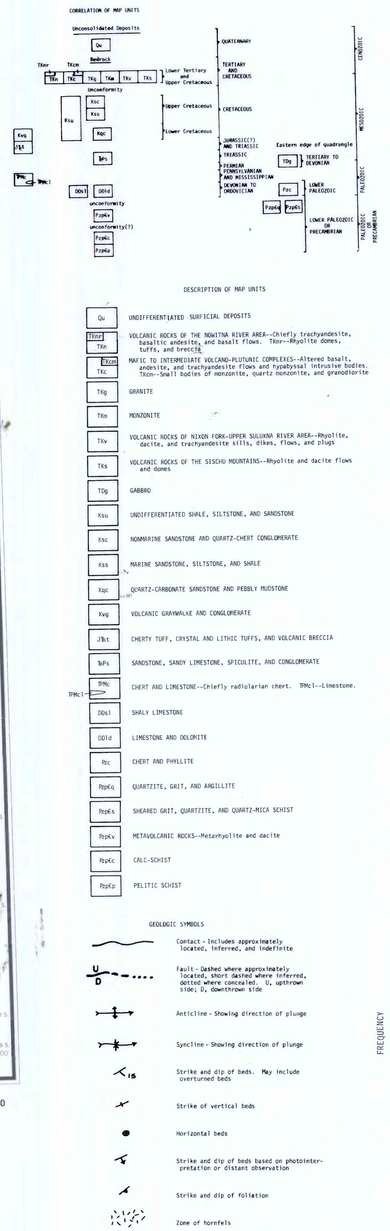
Silberman, M. L., O'Leary, R. M., Gray, J. B., and Patton, W. W. Jr., 1983, Precious metal anomalies associated with silicification and argillic alteration in a rhyolite flow-dome in volcanic rocks of the Nowitna River area, Medfra quadrangle, Alaska, in Coonrad, W. L., and Elliot, R. L., eds., The United States Geological Survey in Alaska--Accomplishments during 1982: U.S. Geological Survey Circular 901, p. 8.

Throckmorton, M. L., and Patton, W. W. Jr., 1978, Contact-metasomatic magnetite deposit, Medfra quadrangle, Alaska: U.S. Geological Survey Open-File Report 78-26.

Van Eeckhout, E. M., Warren, R. G., and Hill, D. E., 1979, Granular hydrogeochemical and stream-sediment reconnaissance of the Medfra and Mt. Molloy quadrangles, Alaska, including concentrations of fourty-three additional elements: Los Alamos Scientific Laboratory Informal Report LA-7393-MS, 210 p.

Ward, F. N., Nakagawa, H. M., Harms, T. F., and Vanlandis, G. H., 1969, Atomic-absorption methods 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.



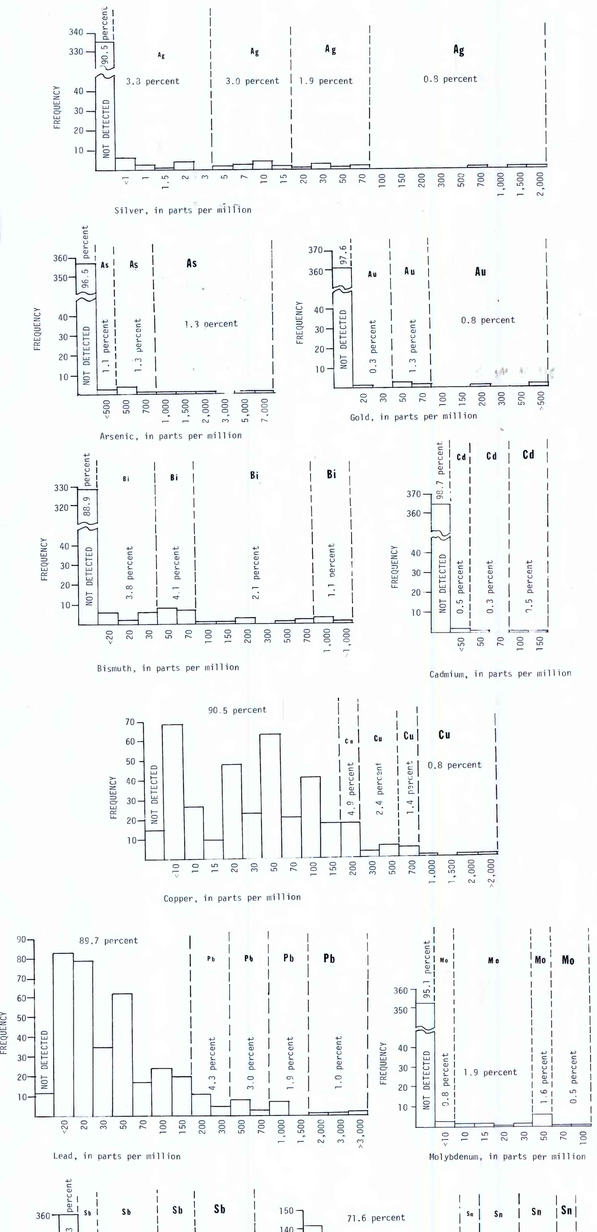


Figure 1.--Histograms for silver, arsenic, gold, bismuth, cadmium, copper, molybdenum, lead, antimony, tin, tungsten, and zinc in 370 nonmagnetic heavy-mineral-concentrate samples, Medfra Quadrangle, Alaska, showing symbols denoting anomalous concentrations and percentage of total number of samples represented by each range.

MULTI-ELEMENT MAPS SHOWING THE DISTRIBUTION AND RELATIVE AMOUNTS OF SELECTED ELEMENTS IN FOUR GEOCHEMICAL SAMPLING MEDIA, MEDFRA QUADRANGLE, ALASKA

By
H. D. King, and R. B. Tripp

1983