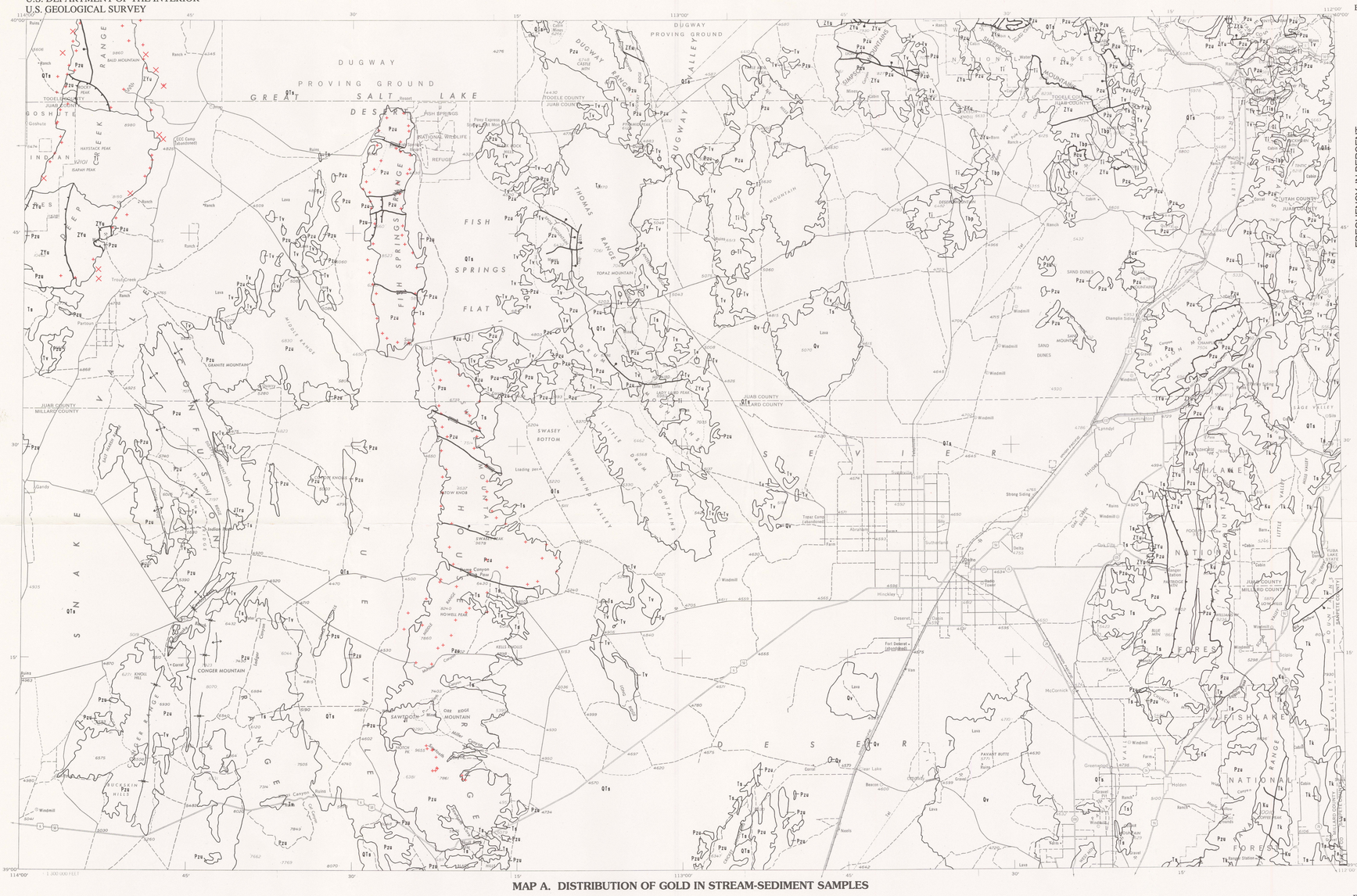


MAP A. DISTRIBUTION OF GOLD IN STREAM-SEDIMENT SAMPLES

EXPLANATION

+ Nonanomalous value

× Anomalous value

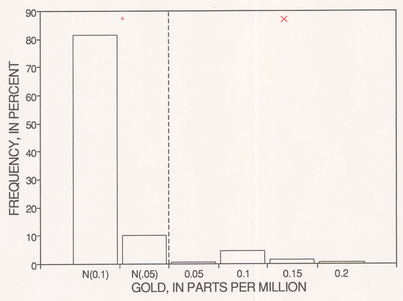
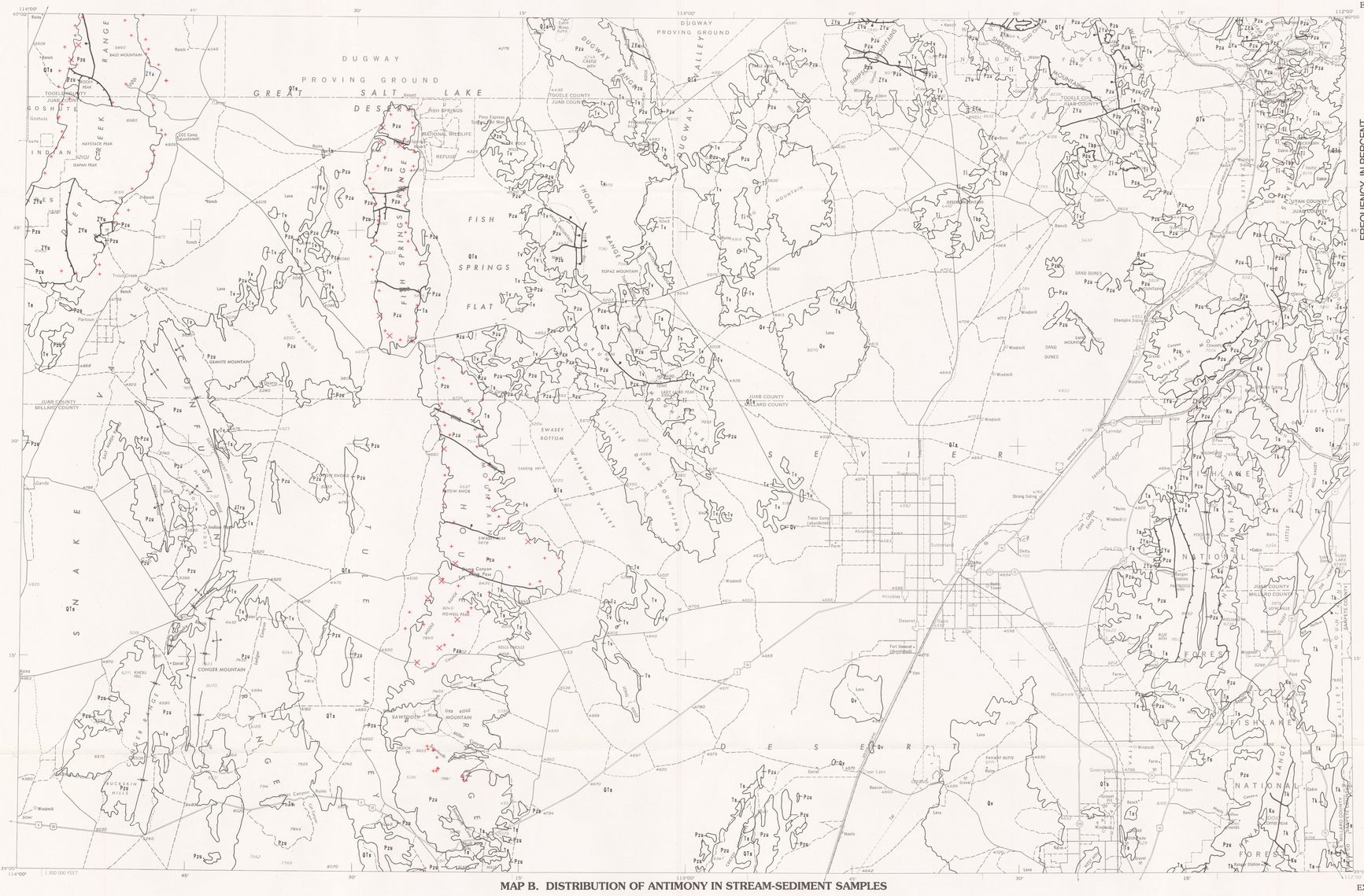


Figure 1. Histogram showing gold concentrations in 161 stream-sediment samples collected from the Delta quadrangle, Utah. N, not detected at 0.1 ppm; L, detected, but less than 0.1 ppm.



MAP B. DISTRIBUTION OF ANTIMONY IN STREAM-SEDIMENT SAMPLES

EXPLANATION

+ Nonanomalous value

× Anomalous value

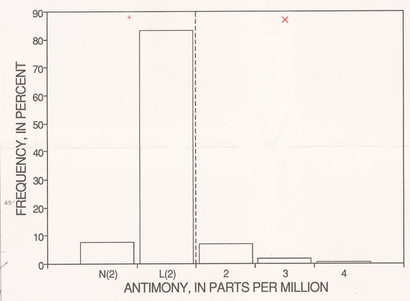
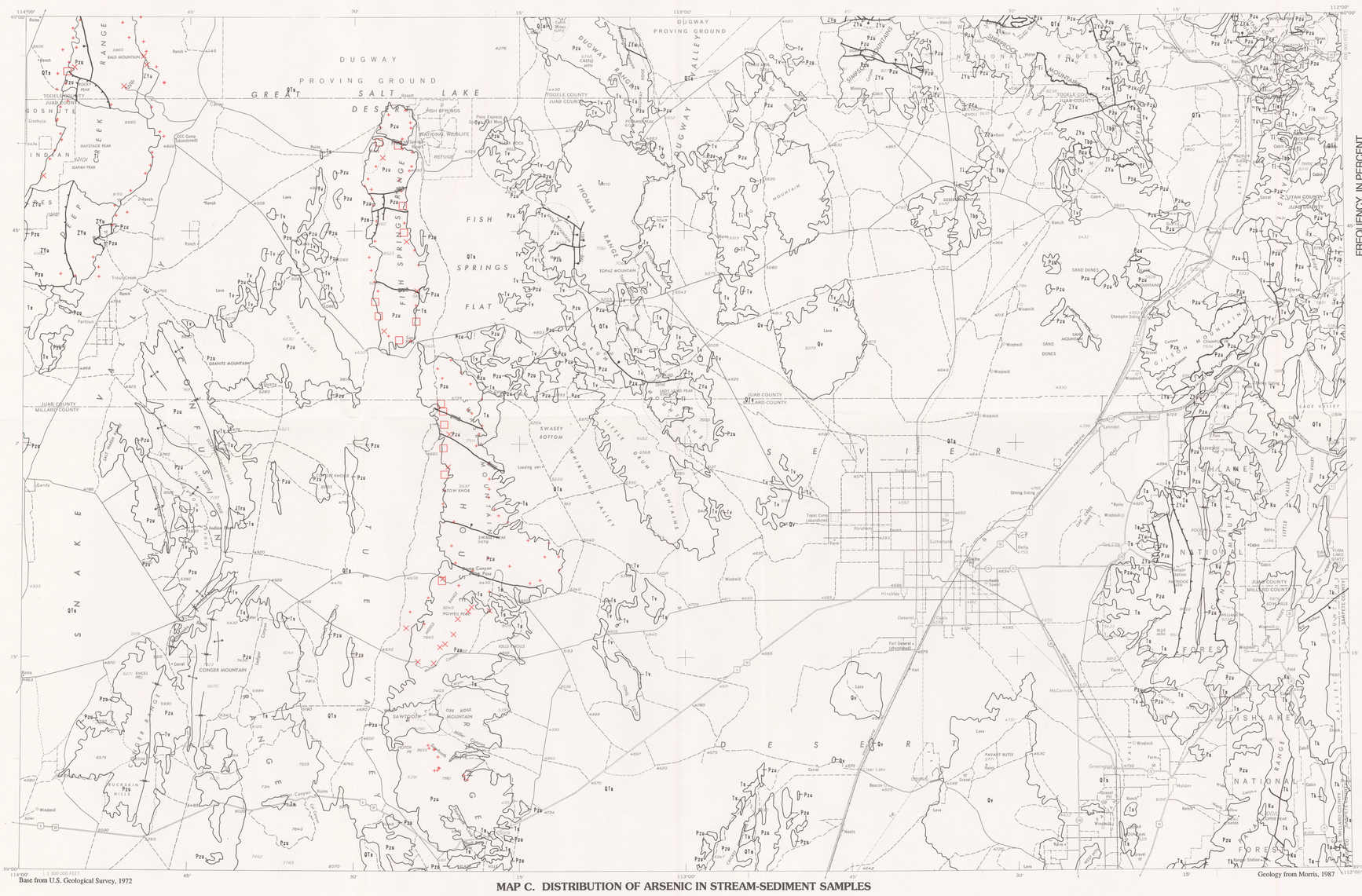


Figure 1. Histogram showing antimony concentrations in 161 stream-sediment samples collected from the Delta quadrangle, Utah. N, not detected at 2 ppm; L, detected, but less than 2 ppm.



Base from U.S. Geological Survey, 1972

Geology from Morris, 1987

MAP C. DISTRIBUTION OF ARSENIC IN STREAM-SEDIMENT SAMPLES

SCALE 1:250 000

5 0 5 10 15 MILES

5 0 5 10 15 KILOMETERS

EXPLANATION

+ Nonanomalous value

× Moderately anomalous value

Highly anomalous value

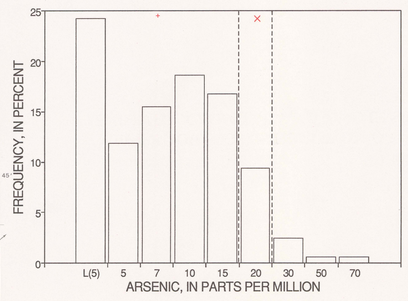


Figure 1. Histogram showing arsenic concentrations in 161 stream-sediment samples collected from the Delta quadrangle, Utah. L, detected, but less than 5 ppm.

STUDIES RELATED TO CUSMAP

This map is part of a folio of maps of the Delta 1° x 2° quadrangle, Utah, prepared under the Conterminous United States Mineral Assessment Program (CUSMAP). Other publications in this folio include an aeromagnetic-anomaly map and related geophysical maps (Kucks, 1991), and a complete Bouguer-gravity-anomaly map and related geophysical maps (Bankey and Cook, 1989).

INTRODUCTION

The Delta quadrangle is located in the eastern part of the Basin and Range physiographic province, near the boundary of the Basin and Range province with the Rocky Mountain and Colorado Plateau provinces. Much of the Tintic-Deep Creek igneous and mineral belt is within the northern part of the quadrangle.

GEOLOGIC SETTING

Bedrock in the quadrangle consists predominantly of a sequence of late Precambrian and Paleozoic strata that was thrust eastward during the Cretaceous Sevier orogeny. These rocks were thrust onto an autochthon of Mesozoic sedimentary rocks in the southeastern part of the quadrangle and onto Precambrian and Paleozoic rocks in other parts of the quadrangle. Much of the northern part of the quadrangle is composed of Oligocene and younger volcanic rocks and related intrusions; a single Jurassic-age stock is present in the southwestern part of the quadrangle. Late Cenozoic extensional tectonism produced north-trending fault blocks; the highlands of these blocks were deeply eroded and the resulting debris was deposited in adjacent basins. Most of the mineral deposits in the Tintic-Deep Creek igneous and mineral belt were formed during the middle and late Cenozoic.

GEOCHEMICAL STUDIES

Data obtained from this regional geochemical study of stream-sediment samples can be used to define broad geochemical patterns and trends that can be combined with geologic and geophysical data to assess the mineral resource potential of this quadrangle. These maps of the Delta 1° x 2° quadrangle show the regional distributions of gold (map A), antimony (map B), arsenic (map C), bismuth (map D), cadmium (map E), and zinc (map F).

Collection of Samples

A total of 161 stream-sediment samples were used to generate the data presented in this report. These samples were collected by the U.S. Geological Survey (USGS) during fieldwork in wilderness study areas. Reports covering other elements analyzed in stream-sediment samples are given in Zimbelman (1993a) and a summary of anomalous abundances in heavy-mineral concentrate samples is presented in Zimbelman (1993b); both of these reports include data from samples collected during the National Uranium Resource Evaluation (NURE) program. However, the NURE samples did not have sufficient material to analyze for gold, antimony, arsenic, bismuth, cadmium, or zinc using the methods described in this report, although they were analyzed for these elements by emission spectrographic methods using lower limits of determination.

The samples consisted of 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 (scale = 1:24,000). Each sample was collected from several localities within an area that may extend as much as 17 m from the site plotted on the map.

ANALYTICAL PROCEDURES

The stream-sediment samples were analyzed by various chemical methods, including an atomic absorption spectroscopy method (Thompson and others, 1968) and an inductively coupled plasma-atomic emission spectrometric method (Crock and others, 1987).

These samples, along with 597 additional NURE samples, were also analyzed by a semiquantitative, direct-current arc emission spectrographic method. Results of analyses for barium, beryllium, copper, lead, molybdenum, silver, and tin are given in Zimbelman (1993a). In general, the samples collected during the NURE program did not have enough material to allow complete analysis by methods other than emission spectrography, and additional chemical analyses were not performed on these samples.

GEOCHEMICAL MAPS

Point-plot maps for the data were prepared using a computer program in the USGS's STATPAC system (VanTrump and Miesch, 1977). The point-plot maps show the locations and magnitudes of geochemical anomalies. Maps showing the distributions of analytical results for barium, beryllium, copper, lead, molybdenum, silver, and tin in stream-sediment samples are given in Zimbelman (1993a). Maps showing the distributions of analytical results for barium, beryllium, cadmium, copper, lead, molybdenum, silver, tin, tungsten, and zinc in heavy-mineral-concentrate samples are presented in Zimbelman (1993b).

GEOCHEMICAL IMPLICATIONS OF THE DATA

Reconnaissance geochemical surveys are valuable tools in mineral exploration, but they should be used in conjunction with data from other earth science disciplines. In particular, outlining exploration targets generally involves considerable additional, more detailed investigations.

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Zimbleman, D.R., 1993b, Maps showing distribution of antimony, arsenic, barium, beryllium,bismuth, cadmium, copper, lead, molybdenum, silver, tin, tungsten, and zinc in heavy-mineral-concentrate samples, Delta 1° x 2° quadrangle, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-2081-E, scale 1:250,000.

DESCRIPTION OF MAP UNITS

Qv Quaternary volcanic deposits (Pleistocene and Holocene)--Flows and pyroclastic deposits of basalt and basaltic andesite

QTs Alluvium and valley fill deposits (Holocene, Pleistocene, and Pliocene)--Colluvium and alluvium in upland areas and fanglomerate, lacustrine units, eolian deposits, and tuffaceous beds in valleys and basins

Tbp Breccia pipes (Oligocene)--Plug- and dike-like bodies containing large and small blocks of Tertiary, Paleozoic, and Precambrian rocks embedded in a matrix of rock fragments, rock flour, and volcanic microbreccia

Tis Sills (Oligocene)--Extensive sheets of porphyritic latite injected into eruptive rocks of the Tintic Mountain Volcanic Group

Ti Intrusive bodies (Tertiary)--Stocks, plugs, and dikes ranging in composition from basic monzonite and latite to alkali granite and rhyolite; chiefly associated with volcanic rocks in the eruptive centers

Tv Tertiary volcanic deposits (Pliocene through Eocene)--Flows, ignimbrites, pyroclastic deposits, and agglomerates ranging in composition from basalt to alkali rhyolite generally localized in well-defined eruptive centers in northern part of quadrangle

Ts Tertiary sedimentary deposits (Pliocene through Paleocene)--Conglomerate, sandstone, shale, limestone, and other continental deposits including Flagstaff, Colton, Green River, Crazy Hollow, Bald Knoll, and other pre-volcanic formations, and Oak City, Fool Creek, and other post-volcanic units

Tk North Horn Formation (Tertiary and Cretaceous)--Red and green post-orogenic shale, sandstone, conglomerate, and limestone. Contains mammalian remains in upper part and dinosaurian remains in the lower part

Ku Cretaceous strata, undivided--Red orogenic conglomerate, sandstone, and minor shale commonly characterized by large, semi-rounded clasts of quartzite and carbonate rocks. Chiefly consists of Canyon Range, Price River, and Indianola Conglomerates; locally includes some Paleocene strata

Ji Jurassic pluton--Pinkish-gray to white, coarsely crystalline quartz monzonite porphyry stock cutting Cambrian strata in House Range. Age is estimated to be 143 Ma

JTRu Jurassic and Triassic strata, undivided--Includes Thaynes Limestone in western part of quadrangle and Moenkopi, Chinle, and Navajo Formations in eastern part of quadrangle

Pzu Paleozoic strata, undivided (Permian through Cambrian)--Includes strata deposited during each period of the Paleozoic Era. These strata are composed of about 60 percent carbonate rock, 30 percent quartzite and sandstone, and 10 percent shale, and are subdivided into as many as 20 or 30 formational units in any one area

ZYu Precambrian Z and Y strata, undivided (upper and middle Proterozoic)--Chiefly quartzite, argillite, and glaciogenic diamictite, with some local beds of algal limestone all subdivided into 6 or more formational units or sequences

Contact--Dashed where approximately located

High-angle fault--Bar and ball on downthrown side; arrows show direction of relative horizontal displacement

Thrust fault--Sawteeth on upper plate. Dotted where concealed; groups of three dots where inferred and concealed. Most concealed positions approximately located

Anticline--Showing trace of axial plane; dotted where concealed

Syncline--Showing trace of axial plane; dotted where concealed

MAPS SHOWING DISTRIBUTION OF GOLD, ANTIMONY, ARSENIC, BISMUTH, CADMIUM, AND ZINC IN STREAM-SEDIMENT SAMPLES, DELTA 1° × 2° QUADRANGLE, UTAH

By
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1993

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INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1993

For sale by U.S. Geological Survey Map Distribution, Box 25286, Federal Center, Denver, CO 80225