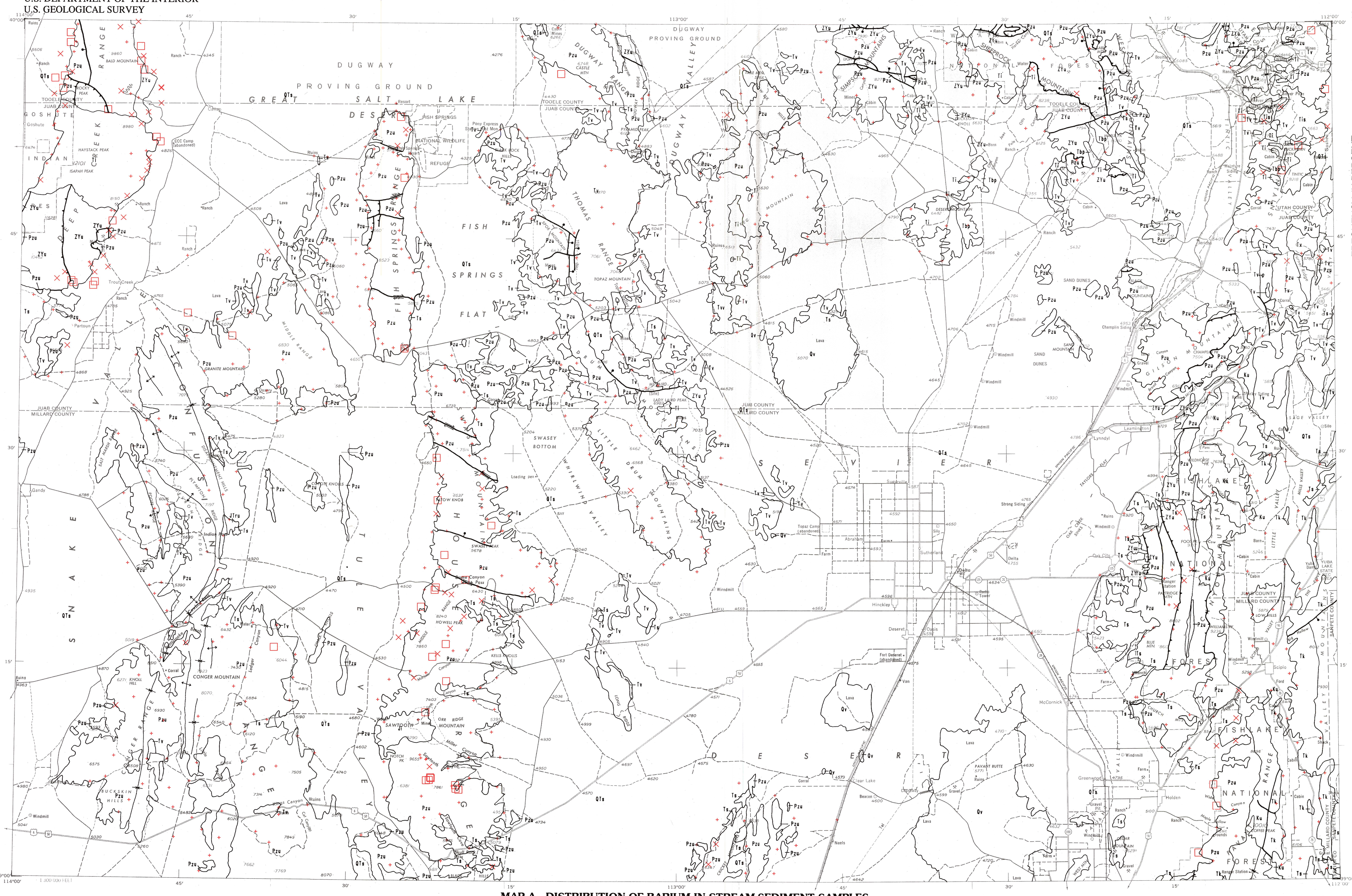
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-2081-C
FOLIO OF THE DELTA 1° X 2° QUADRANGLE, UTAH
SHEET 1 OF 3



MAP A. DISTRIBUTION OF BARIUM IN STREAM-SEDIMENT SAMPLES

EXPLANATION

- + Nonanomalous value
- × Moderately anomalous value
- □ Highly anomalous value

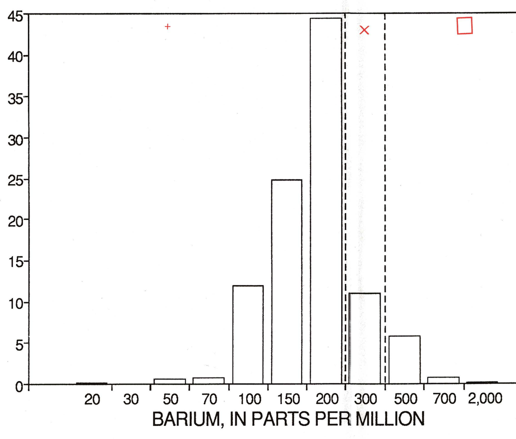
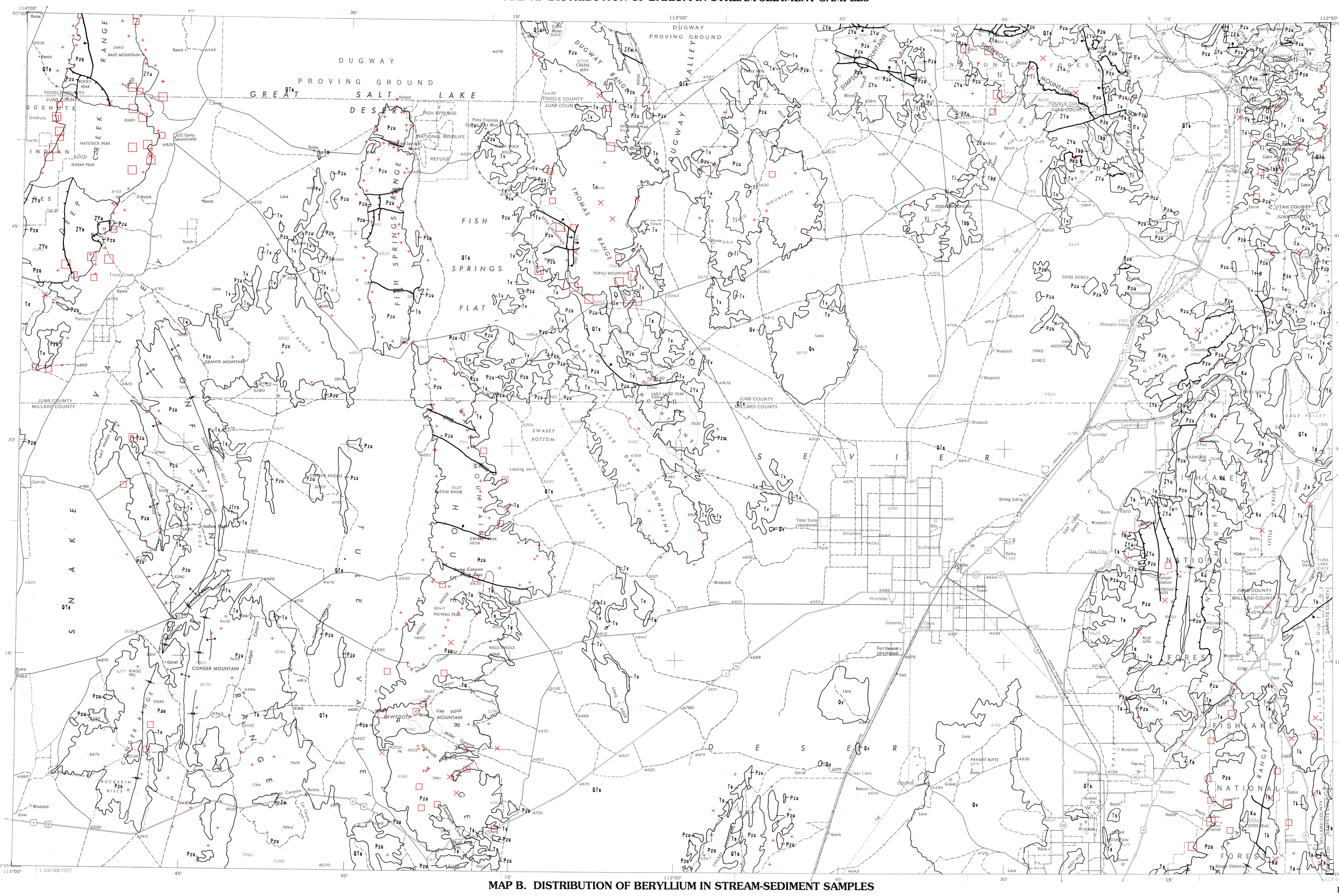


Figure 1. Histogram showing barium concentrations in 758 stream-sediment samples collected from the Delta quadrangle, Utah.



MAP B. DISTRIBUTION OF BERYLLIUM IN STREAM-SEDIMENT SAMPLES

EXPLANATION

- + Nonanomalous value
- × Weakly anomalous value
- □ Moderately anomalous value
- □ Highly anomalous value

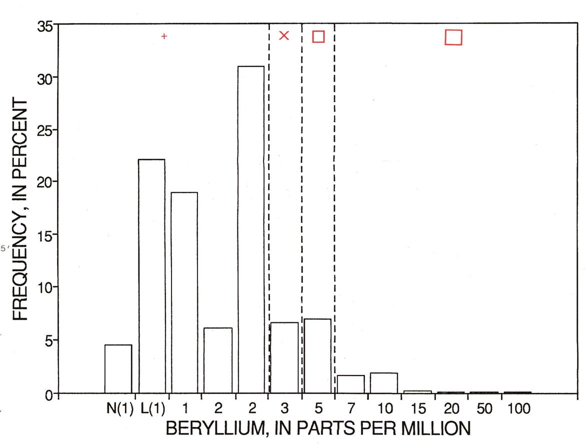
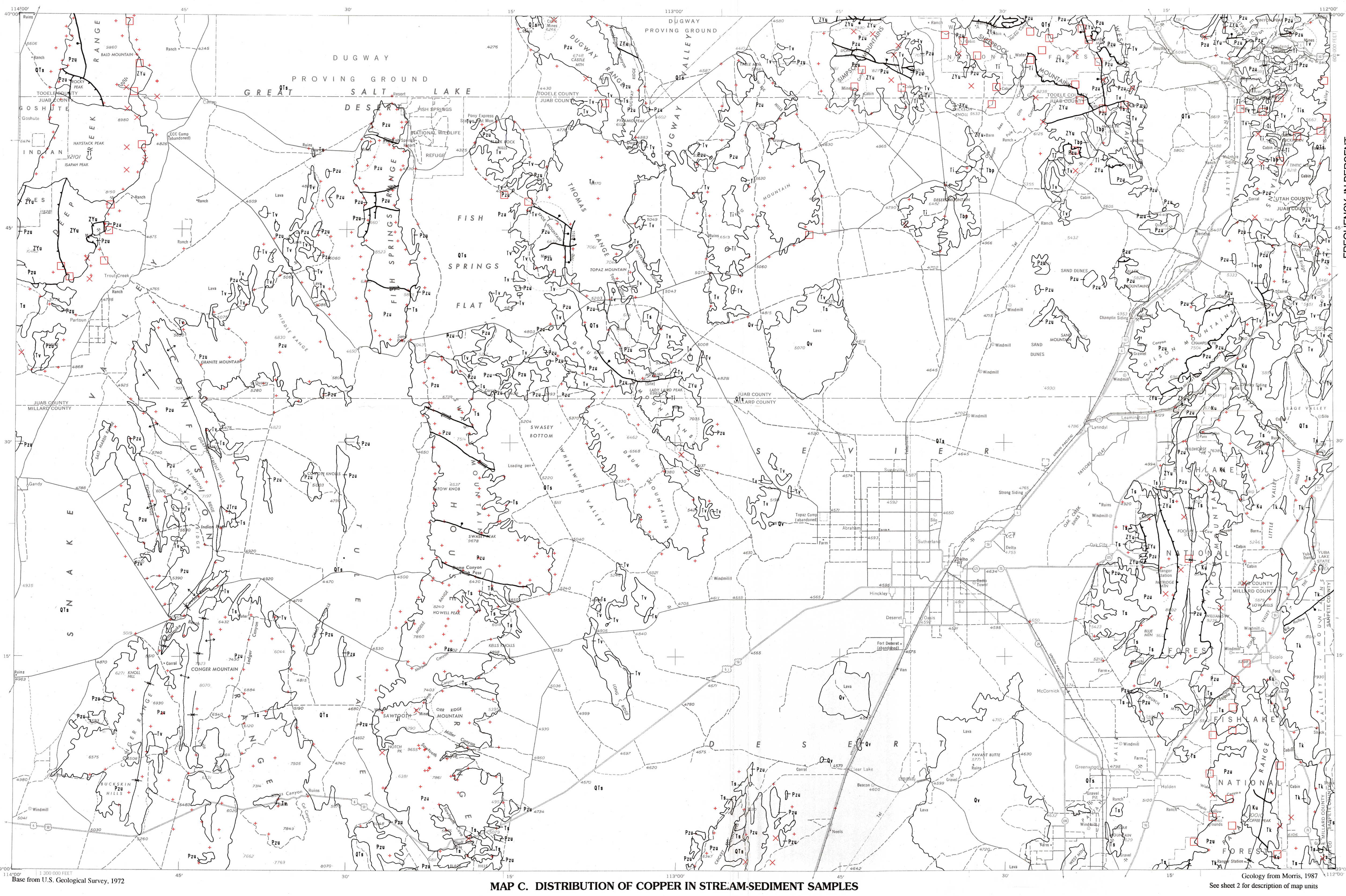


Figure 1. Histogram showing beryllium concentrations in 758 stream-sediment samples collected from the Delta quadrangle, Utah. N, not detected at 1 ppm; L, detected, but less than 1 ppm.



Base from U.S. Geological Survey, 1972

MAP C. DISTRIBUTION OF COPPER IN STREAM-SEDIMENT SAMPLES

Geology from Morris, 1987

See sheet 2 for description of map units

EXPLANATION

- + Nonanomalous value
- × Moderately anomalous value
- □ Highly anomalous value

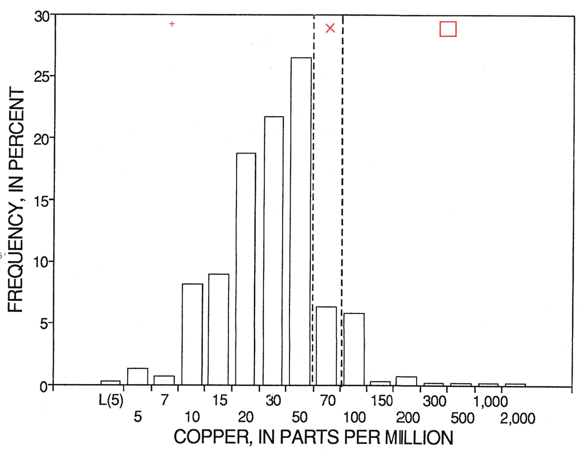


Figure 1. Histogram showing copper concentrations in 758 stream-sediment samples collected from the Delta quadrangle, Utah. L, detected, but less than 5 ppm.

STUDIES RELATED TO CUSMAP

This map is part of a folio of maps of the Delta 1^0 x 2^0 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 1^0 x 2^0 quadrangle show the regional distribution of barium (map A), beryllium (map B), copper (map C), lead (map D), molybdenum (map E), silver (map F), and tin (map G) in stream-sediment samples.

COLLECTION OF SAMPLES

A total of 758 stream-sediment samples were used to generate the data presented in this report. Of these samples, 161 were collected by the U.S. Geological Survey (USGS) and 597 samples were collected during the National Uranium Resource Evaluation (NURE) program.

The samples collected during the NURE program consisted of minus-100-mesh stream sediments that were reanalyzed by the USGS. Generally, these samples contained as much as 500 g of material. NURE stream-sediment samples were a composite of three roughly equal portions of material collected from an area within a distance of about 30 m of the designated sample site (Sharp and Aamodt, 1978).

The samples collected by the USGS 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 sample site plotted on the map.

ANALYTICAL PROCEDURES

Spectrographic Method

The stream-sediment samples were analyzed for 31 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). The results of the analyses can be found in Arbogast and others (1990a,b--results for the NURE samples) and Arbogast and others (1992; 1988a,b--results from USGS samples collected in Wilderness Study Areas, including the Deep Creek Mountains, Swasey Mountain/Howell Peak, and the Fish Springs Range areas). All values are reported within a framework of six steps per order of magnitude (1, 0.7, 0.5, 0.3, 0.2, 0.15, or multiples of 10 of these numbers) and represent approximate geometric midpoints of the concentration ranges. The precision has been shown to be within one adjoining reporting interval on each side of the reported value 83 percent of the time, and within two adjoining intervals 96 percent of the time (Motooka and Grimes, 1976).

The samples collected by the USGS were also analyzed by various chemical methods for gold, antimony, arsenic, bismuth, cadmium, and zinc. Results from these analyses 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, in addition to the locations of all the sample sites. Maps showing the distributions of analytical results for gold, antimony, arsenic, bismuth, cadmium, and zinc in stream sediments collected by the USGS are given in Zimbelman (1993a). Maps showing the distribution 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 obtained from other earth science disciplines. In particular, outlining exploration targets generally involves considerable additional, more detailed investigations.

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Zimbelman, D.R., 1993a, Maps showing distribution of gold, antimony, arsenic, bismuth, cadmium, and zinc in stream-sediment samples, Delta 1^0 X 2^0 quadrangle, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-2081-D, scale 1:250,000.

Zimbelman, 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 1^0 X 2^0 quadrangle, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-2081-E, scale 1:250,000.

MAPS SHOWING THE DISTRIBUTION OF BARIUM, BERYLLIUM, COPPER, LEAD, MOLYBDENUM, SILVER, AND TIN IN STREAM-SEDIMENT SAMPLES DELTA 1° × 2° QUADRANGLE, UTAH

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1993

Manuscript approved for publication March 5, 1993

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1993

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