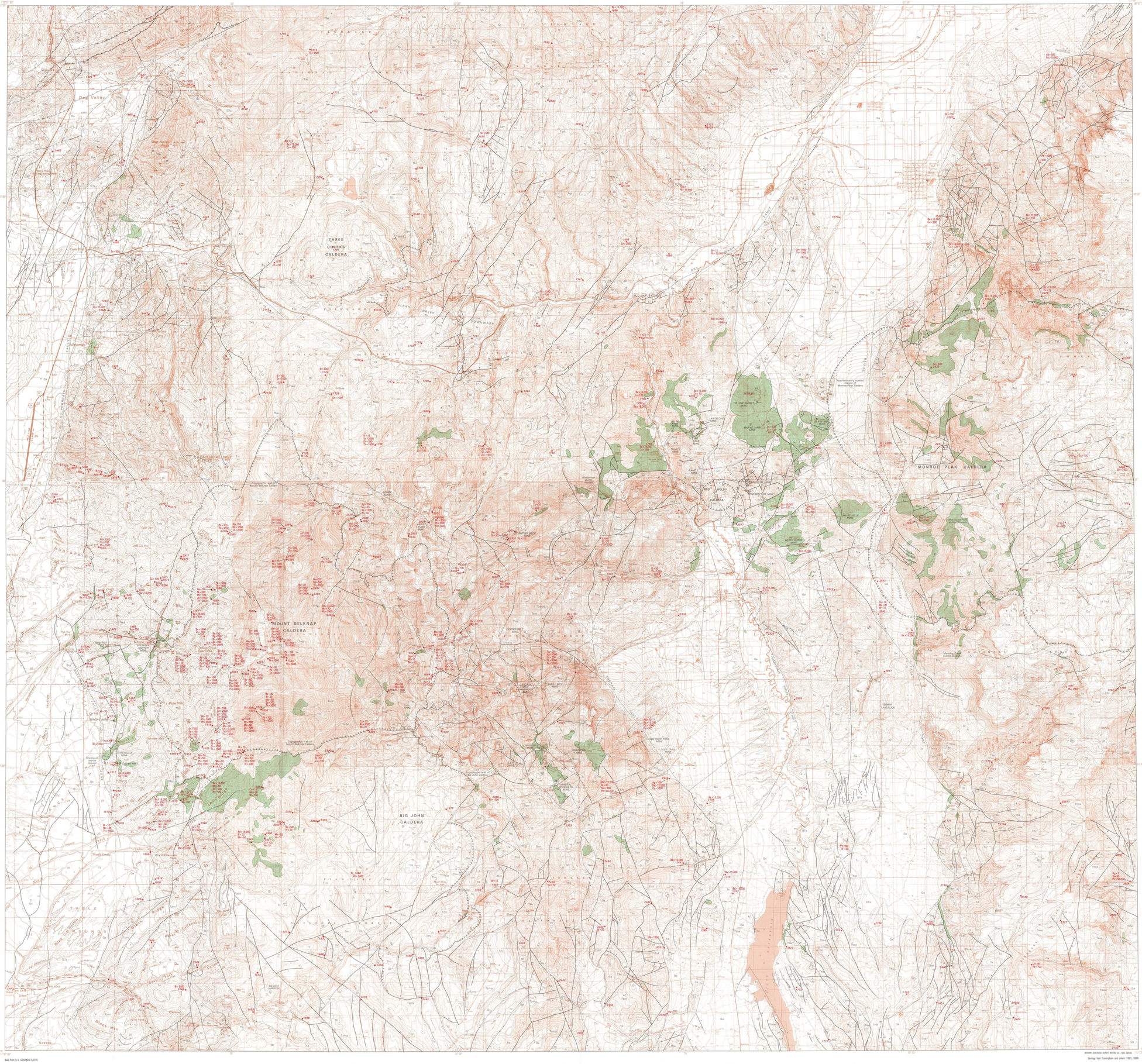
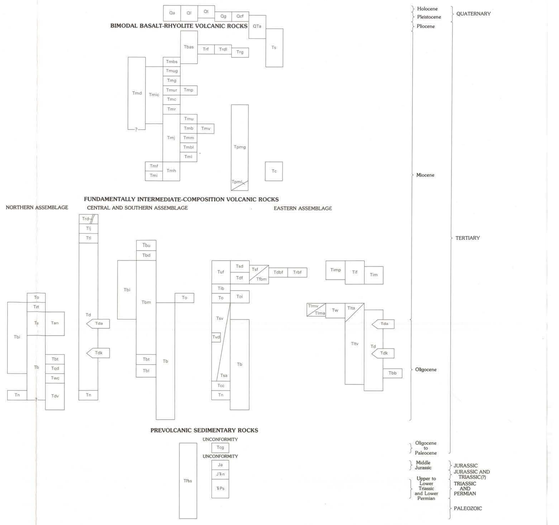
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I-1430-E



CORRELATION OF MAP UNITS



LIST OF MAP UNITS

- Qa — ALLUVIAL DEPOSITS (QUATERNARY)
- Ql — LANDSLIDE DEBRIS (QUATERNARY)
- Qt — TRAVERTINE (QUATERNARY)
- Qg — GLACIAL DEPOSITS (PLEISTOCENE)
- Qcf — BASALTIC ANDESITE OF COVE FORT (PLEISTOCENE)
- QTa — OLDER ALLUVIUM (PLEISTOCENE TO MIOCENE?)
- Ts — SEVIER RIVER FORMATION (PLIOCENE AND MIOCENE)
- Tc — CONGLOMERATE (MIOCENE)

BIMODAL BASALT-RHYOLITE ASSEMBLAGE

- Tbas — BASALT LAVA FLOWS (MIOCENE)
- Trf — RHYOLITE OF FORSHEA MOUNTAIN (MIOCENE)
- Trdl — RHYODACITE OF DRY LAKE (MIOCENE)
- Trg — RHYOLITE OF GILLIES HILL (MIOCENE)
- MOUNT BELKNAP VOLCANICS (MIOCENE)
  - Intrusive rocks
  - Tmd — Dikes and small stocks
  - Tmic — Intracaldera intrusive rocks
  - Tmf — Fine-grained granite
  - Tmi — Porphyritic rhyolitic stocks and volcanic domes
  - Outflow facies volcanic rocks
  - Tmbs — Rhyolite of Big Star
  - Tmug — Upper gray tuff member
  - Tmg — Gray Hills Rhyolite Member
  - Tmur — Upper red tuff member
  - Tmp — Porphyritic lava flows
  - Tmc — Crystal-rich member
  - Tmr — Red Hills Tuff Member
  - Tmj — Joe Lott Tuff Member
  - Tmh — Lower heterogeneous member
  - Intracaldera facies volcanic rocks (Mount Belknap caldera)
  - Tmu — Upper tuff member
  - Tmb — Mount Baldy Rhyolite Member
  - Tmv — Volcaniclastic rocks
  - Tmm — Middle tuff member
  - Tmbl — Blue Lake Rhyolite Member
  - Tml — Lower tuff member
- POTASSIUM-RICH MAFIC VOLCANIC ROCKS IN THE SOUTHERN TUSHAR MOUNTAINS (MIOCENE)
  - Tpmg — Gravels from potassium-rich mafic lava flows
  - Tpml — Potassium-rich mafic lava flows

NORTHERN ASSEMBLAGE OF FUNDAMENTALLY INTERMEDIATE-COMPOSITION VOLCANIC ROCKS

- To — OSIRIS TUFF, OUTFLOW FACIES (MIOCENE)
- Tzt — ZEOLITIC TUFF (MIOCENE)
- Ta — TUFF OF ALBINUS CANYON (MIOCENE OR OLIGOCENE)
- Tabn — BASALTIC ANDESITE (MIOCENE OR OLIGOCENE)
- BULLION CANYON VOLCANICS (MIOCENE AND OLIGOCENE)
  - Tb — Heterogeneous lava flows and volcanic breccias (Oligocene)
  - Tbi — Intermediate-composition intrusive rock (Miocene and Oligocene)
  - Tbt — Three Creeks Tuff Member (Oligocene)
- Tqd — QUARTZ LATITE AND RHYODACITE VOLCANIC DOME AND FLOW (OLIGOCENE)
- Twc — VOLCANIC ROCKS OF WALES CANYON (OLIGOCENE)
- Tn — NEEDLES RANGE FORMATION (OLIGOCENE)
- Tdv — VOLCANIC ROCKS OF DOG VALLEY (OLIGOCENE)

CENTRAL AND SOUTHERN ASSEMBLAGE OF FUNDAMENTALLY INTERMEDIATE-COMPOSITION VOLCANIC ROCKS

- Trd — RHYODACITE TO RHYOLITE DIKES (MIOCENE)
- Tfj — FORMATION OF LOUSY JIM (SIGMUND, 1979) (MIOCENE)
- Tlf — TUFF OF LION FLAT (MIOCENE)
- Td — MOUNT DUTTON FORMATION (MIOCENE AND OLIGOCENE)
  - Tds — Antimony Tuff Member (Oligocene)
  - Tdk — Kingston Canyon Tuff Member (Oligocene)
- Tn — NEEDLES RANGE FORMATION (OLIGOCENE)
- BULLION CANYON VOLCANICS (MIOCENE AND OLIGOCENE)
  - Tbi — Intermediate-composition intrusive rock (Miocene)
  - Tbu — Upper member (Miocene)
  - Tbd — Delano Peak Tuff Member (Miocene)
  - Tbm — Middle member (Miocene and Oligocene)
  - Tbt — Three Creeks Tuff Member (Oligocene)
  - Tbl — Lower member (Oligocene)
  - Tb — Heterogeneous lava flows and volcanic breccia (Miocene and Oligocene)
- To — OSIRIS TUFF, OUTFLOW FACIES (MIOCENE)

EASTERN ASSEMBLAGE OF FUNDAMENTALLY INTERMEDIATE-COMPOSITION VOLCANIC ROCKS

POST-CALDERA VOLCANIC ROCKS FILLING UPPER PART OF MONROE PEAK CALDERA (MIOCENE)

- Tuf — Undivided post-Monroe Peak caldera volcanic rocks
- Tsd — Sanidine-bearing dacitic lava flows
- Tdf — Dacitic lava flows
- Taf — Lava flows of Sage Flat
- Tbm — Lava flows of Bagley Meadows
- Tdbf — Dacite of Big Flat
- Trbf — Rhyodacite of Burnt Flat

INTRUSIONS RELATED TO THE MONROE PEAK CALDERA (MIOCENE)

- Timp — Intrusive rocks of Monrovian Park
- Tif — Intrusive rocks of First Lefthand Fork of Monroe Creek
- Tim — Intrusive rocks undivided
- Tib — INTRACALDERA BRECCIA (MIOCENE)

OSIRIS TUFF (MIOCENE)

- Toi — Intracaldera facies
- To — Outflow facies

VOLCANIC ROCKS OF SIGNAL PARK (MIOCENE AND OLIGOCENE)

- Tsv — Vent facies
- Tss — Alluvial facies
- Tvd — VOLCANIC DOME OR LAVA FLOWS (OLIGOCENE)
- Tb — BULLION CANYON VOLCANICS, HETEROGENEOUS LAVA FLOWS AND VOLCANIC BRECCIA (OLIGOCENE)
- Tcc — VOLCANIC ROCKS OF CLIFF CANYON, ALLUVIAL FACIES (OLIGOCENE)
- Tn — NEEDLES RANGE FORMATION (OLIGOCENE)

VOLCANIC ROCKS OF LANGDON MOUNTAIN (MIOCENE)

- Timv — Vent facies
- Tims — Alluvial facies
- Tw — VOLCANIC ROCKS OF WILLOW SPRING, ALLUVIAL FACIES (MIOCENE)

VOLCANIC ROCKS OF LITTLE TABLE (MIOCENE AND OLIGOCENE)

- Tita — Alluvial facies
- Titv — Vent facies
- Td — MOUNT DUTTON FORMATION (MIOCENE AND OLIGOCENE)
  - Tds — Antimony Tuff Member (Oligocene)
  - Tdk — Kingston Canyon Tuff Member (Oligocene)
- Tbsr — BRUNSWICK BRECCIA (OLIGOCENE)

PREVOLCANIC SEDIMENTARY ROCKS

- TRs — TERTIARY, MESOZOIC, AND PALEOZOIC SEDIMENTARY ROCKS
- Trg — CONGLOMERATE (OLIGOCENE TO PALEOCENE)
- Ja — ARAPIEN FORMATION (MIDDLE JURASSIC)
- J-Rn — NAVAJO SANDSTONE (JURASSIC AND TRIASSIC?)
- TrPs — TRIASSIC AND PERMIAN SEDIMENTARY ROCKS

NOTE: Not all geologic units are identified on this map; a full-color geologic map has been published as U.S. Geological Survey Miscellaneous Investigations Series Map I-1430-A, Cunningham and others (1983).

- CONTACT
- GRADATIONAL CONTACT BETWEEN INTRUSIVE AND EXTRUSIVE PARTS OF THE SAME ROCK UNIT—Approximately located
- FAULT—Dotted where concealed. Bar and ball on downthrown side
- THRUST FAULT—Open pattern and dots where projected beneath cover. Teeth point toward upper plate
- STRIKE AND DIP OF BEDDING OR LAVA FLOWS
  - Inclined
  - Overturned
- STRIKE AND DIP OF COMPACTION FOLIATION
- TOPOGRAPHIC WALL OF CALDERA—Solid where it follows a contact; broken where concealed
- BREAKAWAY SCARP AT HEAD OF A COHERENT BLOCK OF SLUMPED BEDROCK
- QUARTZ VEINS AND ALUNITE VEINS
- ARGILLIC AND ADVANCED ARGILLIC ALTERATION
- SAMPLE LOCALITY, SHOWING SAMPLE NUMBER AND ANALYTICAL VALUES—Complete data are given by Miller and Motooka (1983). Data in parts per million >, greater than value shown

REFERENCES CITED

Campbell, D. L., Cunningham, C. G., Steven, T. A., Rowley, P. D., Glanzgold, L. B., and Anderson, J. J., 1984, Aeromagnetic map on a geologic base map of the Tushar Mountains and adjoining areas, Marysvale volcanic field, Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-1430-D, scale 1:50,000.

Cook, K. L., Halliday, M. E., Cunningham, C. G., Steven, T. A., Rowley, P. D., Glanzgold, L. B., Anderson, J. J., and Coles, L. L., 1984, Complete Bouguer gravity anomaly map on a geologic base map of the Tushar Mountains and adjoining areas, Marysvale volcanic field, Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-1430-C, scale 1:50,000.

Cunningham, C. G., Steven, T. A., Rowley, P. D., Glanzgold, L. B., and Anderson, J. J., 1983, Geologic map of the Tushar Mountains and adjoining areas, Marysvale volcanic field, Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-1430-A, two sheets, scale 1:50,000.

_____1984, Map of argillic and advanced argillic alteration and principal hydrothermal quartz and alunite veins in the Tushar Mountains and adjoining areas, Marysvale volcanic field, Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-1430-B, scale 1:50,000.

Miller, W. R., and Motooka, J. M., 1983, Analytical results of a geochemical survey utilizing heavy-mineral fractions and the less-than-180-micrometer fraction of stream sediments, Tushar Mountains and adjoining areas, Marysvale volcanic field, Utah: U.S. Geological Survey Open-File Report 83-164, 108 p.

Miller, W. R., Motooka, J. M., Cunningham, C. G., Steven, T. A., Rowley, P. D., and Anderson, J. J., 1984a, Distribution of anomalous trace elements in the magnetic fraction of heavy-mineral concentrates of stream sediments, shown on a geologic base map of the Tushar Mountains and adjoining areas, Marysvale volcanic field, Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-1430-E, scale 1:50,000.

_____1984b, Distribution of anomalous trace elements in the nonmagnetic fraction of heavy-mineral concentrates of stream sediments, shown on a geologic base map of the Tushar Mountains and adjoining areas, Marysvale volcanic field, Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-1430-F, scale 1:50,000.

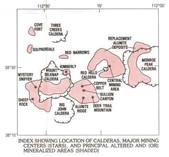
Sigmund, J. M., 1979, Geology of a Miocene rhyodacite lava flow, southern Tushar Mountains, Utah: Kent, Ohio, Kent State University, unpublished M.S. thesis, 30 p.

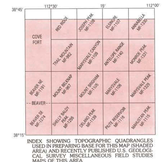
NOTE

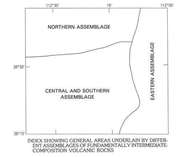
Nonmagnetic and magnetic fractions of heavy-mineral concentrates and the less-than-180-micrometer fraction of stream sediments from a geochemical survey of the Tushar Mountains and adjoining areas were analyzed to evaluate the distribution of trace elements. Geochemical maps showing the distribution of trace elements associated with ore deposits were constructed for the nonmagnetic fraction (this map), the magnetic fraction (Miller and others, 1984a), and less-than-180-micrometer fraction (Miller and others, 1984b).

A description of the sample collection, sample preparation, analytical methods, and a complete listing of the analytical data corresponding to the sample localities shown on this map are given by Miller and Motooka (1983). Of these data, only those values (in parts per million) considered anomalously high in concentration relative to background values (Miller and Motooka, 1983) are shown here.

This map is intended to be used with other maps in the series (Cunningham and others, 1983; Campbell and others, 1984; Cook and others, 1984; Cunningham and others, 1984) to help evaluate the mineral resource potential of the Tushar Mountains and adjoining areas, Marysvale volcanic field, Utah.







SCALE 1:50 000

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1 0 1 2 3 KILOMETERS

CONTOUR INTERVALS 40 AND 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UTAH — MAP AREA

DISTRIBUTION OF ANOMALOUS TRACE ELEMENTS IN THE NONMAGNETIC FRACTION OF HEAVY-MINERAL CONCENTRATES OF STREAM SEDIMENTS, SHOWN ON A GEOLOGIC BASE MAP OF THE TUSHAR MOUNTAINS AND ADJOINING AREAS, MARYSVALE VOLCANIC FIELD, UTAH

By

William R. Miller, Jerry M. Motooka, Charles G. Cunningham, Thomas A. Steven, Peter D. Rowley, and John J. Anderson

1984

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