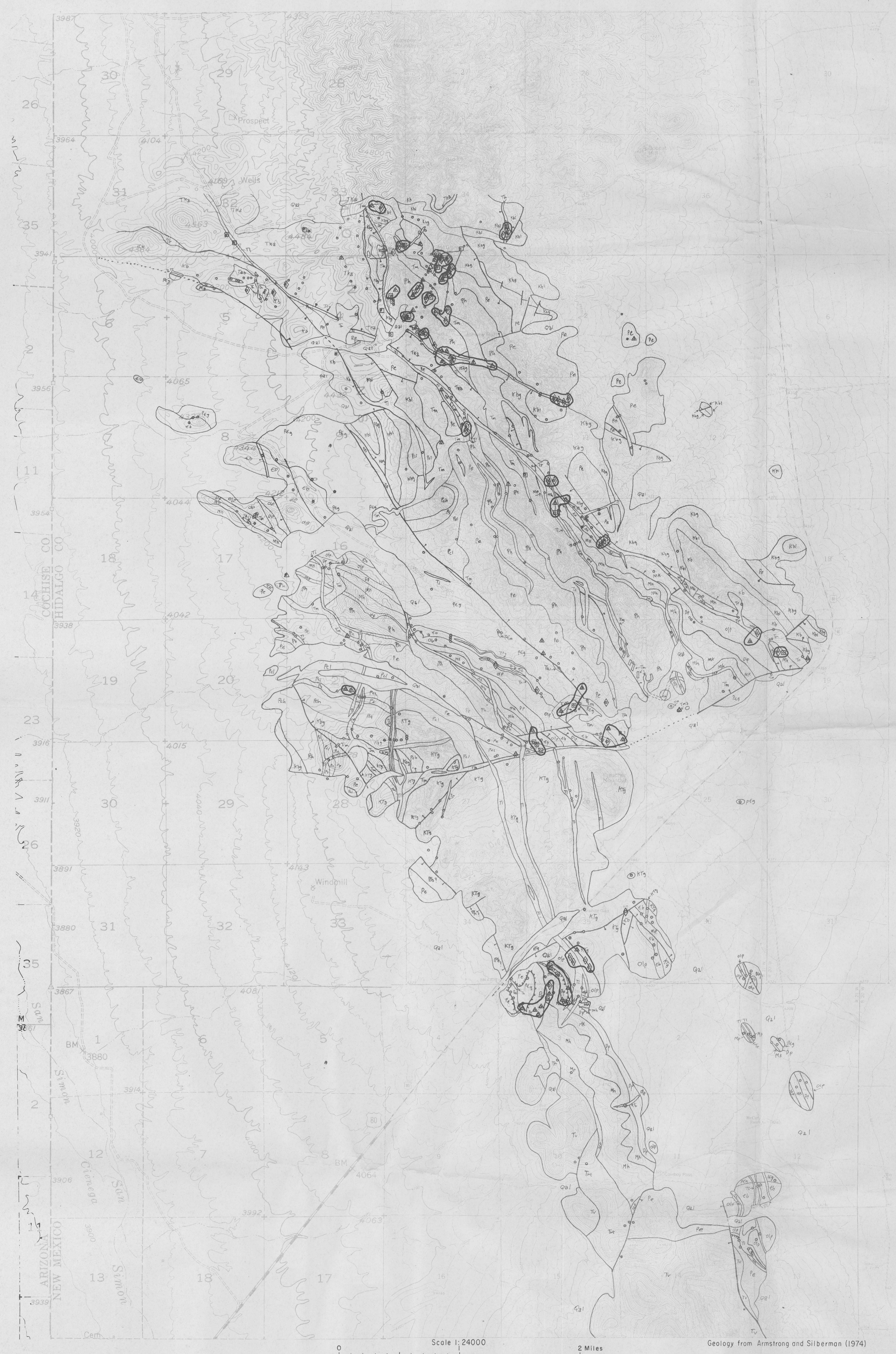
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared in cooperation with the
NEW MEXICO BUREAU OF MINES & MINERAL RESOURCES

OPEN FILE MAP 74-112
SHEET 4 OF 7



Scale 1:24000

Geology from Armstrong and Silberman (1974)

GEOLOGIC and GEOCHEMICAL MAP SHOWING DISTRIBUTION and ABUNDANCE of SILVER, CENTRAL PELONCILLO MTS., HIDALGO CO., NEW MEXICO

by M. L. SILBERMAN, R. B. CARTEN, & A. K. ARMSTRONG

SILVER

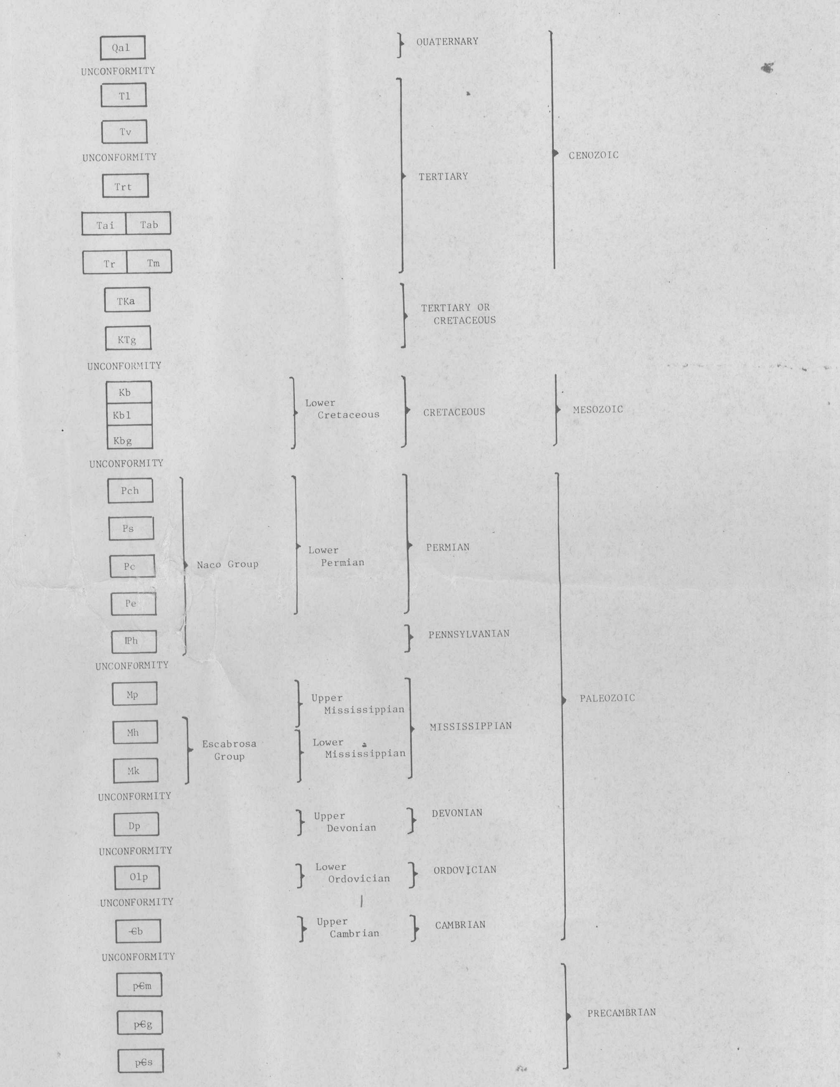
△ 1-9 ppm

□ 10-30 ppm

◇ 50 ppm and greater

Clusters of sample localities with anomalous amounts of trace metals

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qal ALLUVIAL AND LACUSTRINE DEPOSITS (Quaternary) Coarse gravels, silts, sands, and lake bed deposits on east side of map

Tv VOLCANIC ROCKS UNDIFFERENTIATED (Tertiary)

Trt RHYOLITE TUFFS (Tertiary) White, light gray

Tl LATITE PORPHYRY (Tertiary) Labradorite, orthoclase, biotite

Tab ANDESITE BRECCIA (Tertiary)

Tai ANDESITE SILLS (Tertiary)

Tr RHYOLITE DIKES-PLUGS (Tertiary) Light gray to white, aphanitic

Tm QUARTZ MONZONITE PORPHYRY (Tertiary) Quartz, orthoclase, andesine

TKa ANDESITE (Cretaceous-Tertiary) Intensely altered, chlorite, epidote

KTg GRANITE (Cretaceous-Tertiary) Quartz, orthoclase, oligoclase, 1% biotite

BISBEE FORMATION(?) (Cretaceous)

Kb SANDSTONE, SHALES, AND MARL

Kbl ARENACEOUS LIMESTONE

Kbg GLANCE(?) CONGLOMERATE MEMBER Conglomerates, shales, sandstones

NACO GROUP (Pennsylvanian and Permian)

Pch CONCHA LIMESTONE (Permian) Gray, cherty, crinoidal limestone

Ps SCHERRER FORMATION (Permian) Maroon shales, siltstones, sandstones

Pc COLINA LIMESTONE (Permian) Gray micritic limestones

Pe EARP FORMATION (Permian) Gray limestones, shales and siltstones

IPh HORQUILLA LIMESTONE (Pennsylvanian) Gray cherty limestone

Mp PARADISE FORMATION (Mississippian) Gray to brown, micrite, oolitic limestones, shales and siltstones

ESCABROSA GROUP (Mississippian)

Mh HACHITA FORMATION Light-gray crinoidal limestone

Mk KEATING FORMATION Gray limestone, cherty limestone

Dp PERCHA SHALE (Devonian) Calcareous to black shales

Olp EL PASO LIMESTONE (Ordovician) Light-gray dolomites and limestones

-Cb BOLSA QUARTZITE (Cambrian) Arkosic to quartz quartzite

p-Cm METADIABASE (Precambrian)

p-Cg PORPHYROBLASTIC GRANITE (Precambrian)

p-Cs GREENSCHIST (Precambrian)

MAP SYMBOLS

Contact, showing dip
Dashed where approximately located;
dotted where concealed

Fault, showing dip
Dashed where approximately located

Concealed fault

Thrust fault
Sawteeth on upper plate. Dashed where approximately located

Anticline
Showing crestline

Syncline
Showing troughline and direction of plunge

Strike and dip of beds

Strike of vertical beds

Strike and dip of overturned beds

Strike and dip of foliation and plunge of lineation

Strike of vertical foliation

Approximate outline of metamorphic halo

DESCRIPTION

Introduction

Detailed geologic mapping and geochemical rock sampling of the central Peloncillo Mountains, Hidalgo County, New Mex., was completed in the fall 1973. The project was cooperatively sponsored by the U.S. Geological Survey and New Mexico Bureau of Mines and Mineral Resources. The objectives were to: (1) map this structurally complex area in greater detail than previous studies (Gillerman, 1958); (2) determine the abundance and distribution of select trace metals, and (3) distinguish factors controlling the abundance and distribution of those metals.

Sample locations and trace-metal abundance symbols are plotted on a geologic base map modified from Armstrong and Silberman (1974). Cross sections showing structural relations can be found in that reference.

GEOLOGY

The central Peloncillo Mountains are composed dominantly of Mesozoic carbonate and Paleozoic carbonate and clastic sedimentary rocks that unconformably overly Precambrian granite. The sedimentary rocks are intruded and metamorphosed by four groups of igneous rocks. These are, from oldest to youngest: (1) quartz monzonite (at Granite Gap), (2) quartz monzonite porphyry dikes and sill-like masses, (3) fine-grained felsite dikes, generally found in northwest-trending faults and northeast-trending fractures, and (4) latite porphyry dikes and sills which cut all older igneous and sedimentary rocks.

The mountain range is broken by major northwest-trending high-angle normal faults, which are important elements in controlling the emplacement of the felsite and many of the latite porphyry dikes and sills. Two high-angle normal northeast-trending cross faults occur in the vicinity of Granite Gap; the northern one, the Preacher Mountain fault, localizes a major quartz monzonite dike (Carten and others, 1974).

The maps show the distribution and abundance of Cu, Pb, Zn, Ag, Bi, Mo, and W in rock samples taken from the range. Samples represent garnet-bearing skarns, fault and shear zones, fractures, veins, gossans, and altered igneous, metamorphic, and sedimentary rocks.

Distribution and abundance of trace metals are strongly structurally controlled. Steep northwest- and northeast-trending normal faults localize emplacement of igneous dikes and sills. Metamorphic aureoles are restricted to the areas surrounding the igneous rocks, and it is within these aureoles that the mineral deposits and the anomalous concentrations of the trace metals are found.

Trace element distribution

Large areas containing anomalous amounts of Cu, Pb, Zn, and Ag occur within garnet-bearing skarn rocks adjacent to quartz monzonite porphyry, felsite, latite porphyry dikes. The dikes were emplaced along the northwest-oriented Johnny Bull fault and nearby subparallel faults, as well as along the northeast-oriented Preacher Mountain fault. Lesser but still anomalous metal concentrations occur within the igneous rocks themselves. Anomalous concentrations of these elements occur in various rock types surrounding Pb-Zn replacement deposits near McGhee Peak. These ore deposits are associated with northeast-trending felsite dikes which branch from a large quartz monzonite sill. Further east, a zone containing anomalous amounts of Pb, Zn, and Ag occurs within and adjacent to a large felsite dike near the Carbonate Hill mine.

Within the Granite Gap mining district, anomalous concentrations of base metals and Ag occur in small, largely oxidized hydrothermal sulfide veins in highly fractured limestone. Small areas containing anomalous amounts of Cu, Pb, and Zn occur elsewhere in the range, north of Granite Gap, where quartz monzonite porphyry and latite porphyry dikes intrude and metamorphose the sedimentary rocks. The largest of these areas occur along the trends of the northwest-trending Johnny Bull fault and the northeast-trending Preacher Mountain fault.

Bi and W are more restricted in distribution than the base metals and Ag. They are both concentrated within the thermal metamorphic zones around igneous dikes and sills. This is true in general for Mo also, although some Mo occurs in the oxidized sulfide veins at Granite Gap.

Within the McGhee Peak subdistrict, as defined by W. E. Elston (written commun., 1973), a zoning pattern exists with relative enrichment of Cu along and close to the Johnny Bull fault. Pb-Zn-Ag enrichment occurs further east around the large quartz monzonite porphyry sill near McGhee Peak and near the Carbonate Hill mine. Similar zoning patterns are found elsewhere in the range, including the base-metal anomaly centered 3 miles northwest of where the Johnny Bull fault is concealed by alluvium at the eastern edge of the map.

All samples were prepared and analyzed for Cu and Zn in truck-mounted mobile analytical laboratories of the U.S. Geological Survey. Cu and Zn were determined by atomic absorption methods by D. G. Murrey and R. B. Carten. Pb, Ag, W, Bi, and Mo were determined by semiquantitative spectrographic methods by D. F. Siems and W. D. Crim at U.S. Geological Survey laboratories at Denver, Colo., and are reported as values in the series 1, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1 ppm, etc.

REFERENCES

Armstrong, A. K., and Silberman, M. L., 1974, Geologic map of the central Peloncillo Mountains, Hidalgo County, New Mexico: U.S. Geol. Survey Open-file Map 74-11, scale 1:24,000.

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Gillerman, Elliot, 1958, Geology of the central Peloncillo Mountains, Hidalgo County, New Mexico, and Cochise County, Arizona: New Mexico Bur. Mines and Mineral Resources Bull. 57, 152 p.