UNITED STATES DEPARTMENT OF THE INTERIOR,
GEOLOGICAL SURVEY

Preliminary mineral resource assessment of the proposed Mt. Wrightson Wilderness, Santa Cruz and Pima Counties, Arizona

by

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This report is preliminary and has not been reviewed for conformity with U. S. Geological Survey editorial standards and stratigraphic nomenclature.

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SUMMARY

The proposed Mt. Wrightson Wilderness contains a tract favorable for the occurrence of one or more undiscovered porphyry copper deposits, and four tracts favorable for the occurrence of undiscovered precious- and base-metal vein deposits. The potential porphyry copper deposits have the most significance.

INTRODUCTION

The proposed Mt. Wrightson Wilderness (H. R. 4707) consists of about 25,000 acres in the Coronado National Forest, Pima and Santa Cruz Counties, southeastern Arizona. The area includes parts of four mining districts, Greaterville, Old Baldy, Tyndall, and Wrightson. There has been intermittent mining activity in the area from before 1700 to the present.

Information for this report was derived largely from studies by Drewes (1971a, 1971b, 1973, 1980), and from several sources that catalog known mining properties . There have been no detailed geophysical studies or detailed mineral investigations of the area.

GEOLOGY AND STRUCTURE

Information on geology and structure is summarized from Drewes (1973). The oldest rocks in the area are Precambrian igneous and metamorphic rocks. These are overlain by several thousand feet of Paleozoic shallow-water sedimentary rocks. Above this is a sequence of Triassic volcanic and sedimentary rocks. Both Early and Late Cretaceous volcanic sections are present, along with some admixed continental sedimentary rocks of Cretaceous age.

The layered rocks described above are intruded by Triassic, Jurassic, and Late Cretaceous granitoid rocks in the form of large stocks. Small stocks, plugs, and dikes of granodiorite, dacite porphyry, and quartz latite porphyry, largely of Late Paleocene age, occur throughout the area. Most of the mineralized quartz veins in the area are also of Paleocene or slightly younger age. Potential porphyry copper deposits in the area would be the result of igneous activity of this age, as are the porphyry copper deposits surrounding the Mt. Wrightson area.

The rocks of the area have been abundantly faulted and folded, with the major part of the deformation occurring during Latest Cretaceous through Paleocene time, the Laramide orogeny.

The geologic map (Figure 1) shows the rocks of the area divided as to whether they are older than, contemporaneous with, or younger than the time of major porphyry copper emplacement in southeastern Arizona.

KNOWN MINERAL DEPOSITS

Information about the known mineral deposits is compiled from three major sources (Keith, 1974; Keith, 1975; CRIB[1]), and is portrayed in Figure 2. Mining began early in the area; the Spanish Jesuits recovered silver from deposits in the southwestern part of the area before 1700, in what was to become the Tyndall mining district.

[1]CRIB: Computerized Resources Information Bank, a data base of mineral-deposit information available to the public from the U.S. Geological Survey.

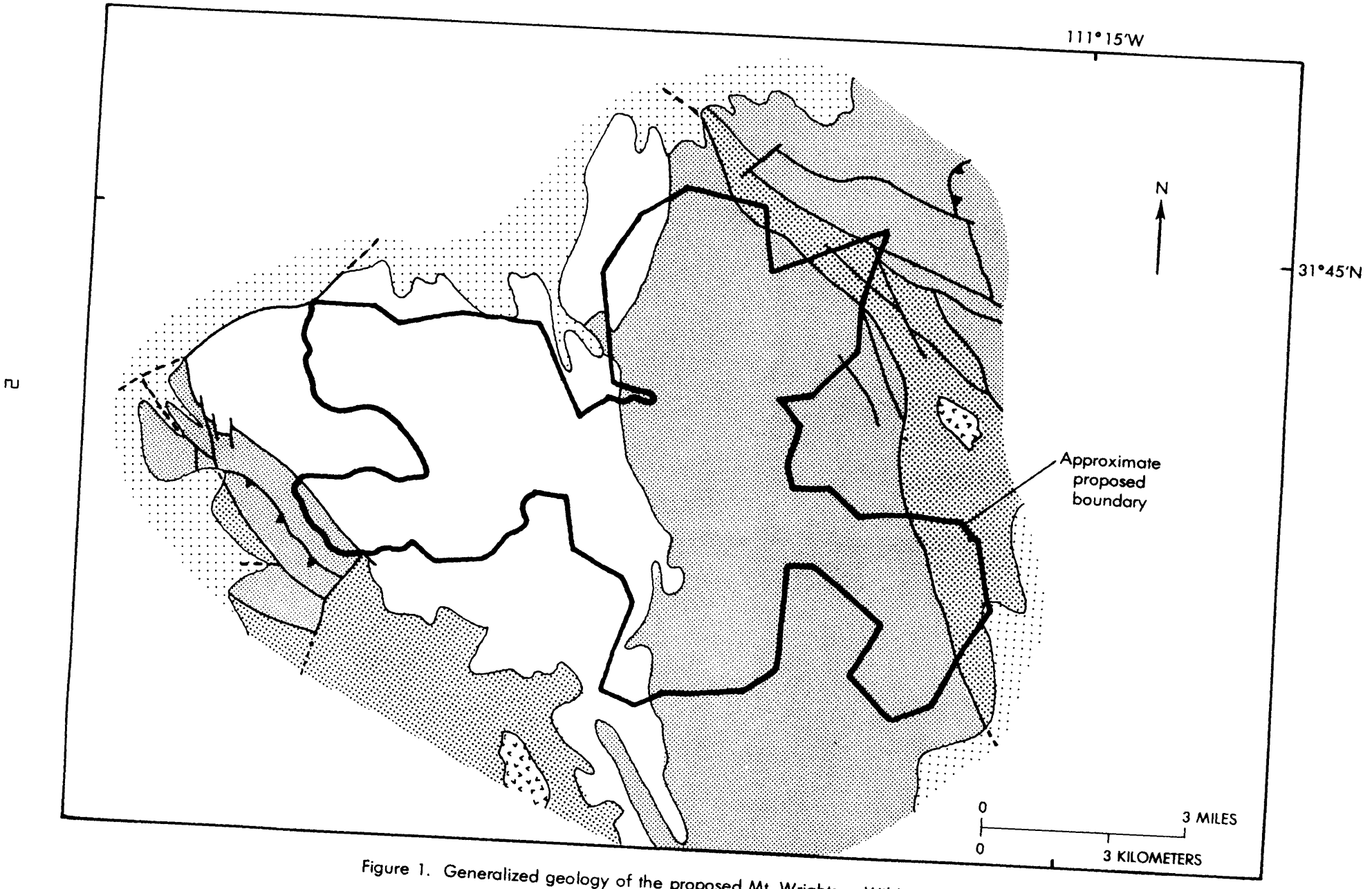

Figure 1. Generalized geology of the proposed Mt. Wrightson Wilderness

FIGURE 1

EXPLANATION

Alluvial cover

Igneous rocks younger than major porphyry copper deposits

Volcanic and sedimentary rocks approximately contemporaneous with major porphyry copper deposits

Igneous rocks approximately contemporaneous with major porphyry copper deposits

Sedimentary, volcanic, and igneous rocks older than major porphyry copper deposits

Reverse and normal faults, dashed where concealed

Thrust faults, barbs on upper plate

Geologic contact

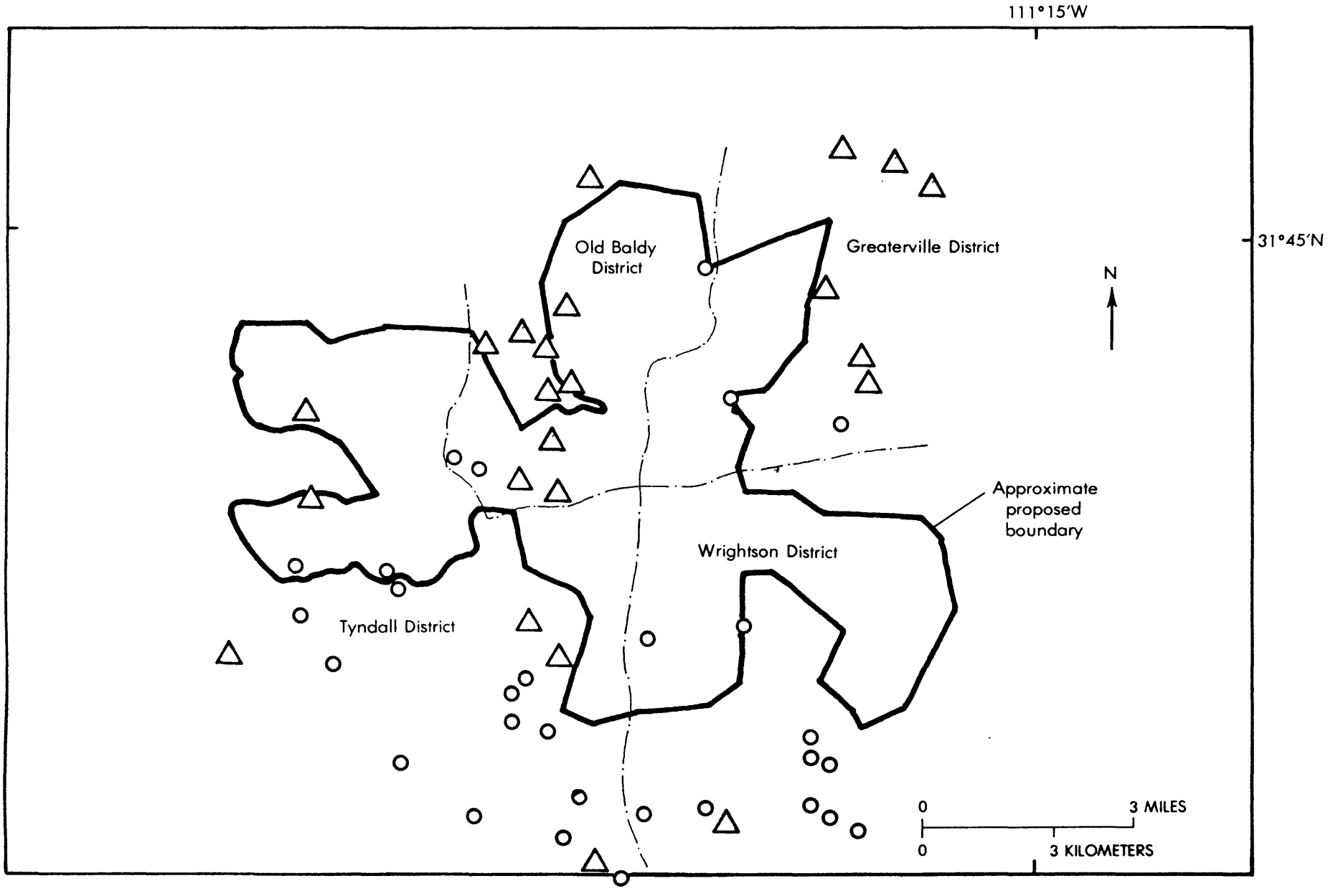

Figure 2. Known mineral deposits and prospects in and near the proposed Mt. Wrightson Wilderness

FIGURE 2

EXPLANATION

△ Known mineral deposits for which some commodity and production information is known

○ Additional deposits and prospects known only from topographic map

—·— Approximate boundary of mining district

The known deposits are mostly quartz veins with galena, sphalerite, pyrite, chalcopyrite, tetrahedrite, and gold. Barite is an important gangue mineral in parts of the area. Silver has been the metal most commonly sought, though the total value of lead produced has probably been greater than that of silver.

Production data for individual mines is not available. Keith (1974) estimates total production through 1972 for the four districts (chiefly from Tyndall) as follows: 62,000 tons of ore containing about 640 tons of copper, 9,900 tons of lead, 2,800 tons of zinc, 540,000 ounces of silver, and 1,660 ounces of gold.

The Rosemont and Helvetia porphyry copper deposits, not yet in production, are approximately 6 and 8 miles northeast of the area. Rosemont has reserves of more than 300,000,000 tons of ore at a grade of more than 0.6% copper; Helvetia has reserves of more than 20,000,000 tons of ore at a grade of more than 0.7% copper (Gilmour, 1982).

GEOCHEMISTRY

During the mapping of the Mt. Wrightson and Sahuarita quadrangles by Drewes during 1962-1969 (Drewes, 1971a,b), a geochemical reconnaissance of the area was also performed. Readers are directed to Drewes (1973) for a detailed discussion of the sampling and analytical methods. The data discussed in this section is that of Drewes; the interpretation is that of the present author.

Figure 3 portrays the most salient results of the reconnaissance for the Mt. Wrightson area. Lead and zinc anomalies are found in two northwest-trending bands that are, in part at least, coincident with quartz veins mapped by Drewes (1973) and with known deposits (Figure 2). Copper anomalies occur chiefly in the area in between the two base-metal-rich zones, in an area that is largely barren of historic workings. This pattern of lead and zinc surrounding copper is a classic metal zoning pattern that is seen in many porphyry copper systems.

AREAS FAVORABLE FOR UNDISCOVERED DEPOSITS

Porphyry Copper Deposits

The elongate, northwest-trending area, enclosed by dashed lines and labeled 'A' in Figure 4, is favorable for the occurrence of one or more porphyry copper deposits. The area enclosed with a solid line has the highest potential. This tract is characterized by a number of features that indicate a high favorability. It is surrounded by a swarm of copper-bearing precious- and base-metal vein deposits. There are large areas of observed argillic alteration. The geochemical signature is appropriate. There are rocks of the appropriate age and chemical composition in the area. The proximity of the porphyry copper deposits at Red Mountain (Patagonia) to the south, and Rosemont and Helvetia to the north lends additonal credence to the postulation of the existence of porphyry copper deposits in the Mt. Wrightson area.

Precious- and Base-metal Vein Deposits

Four tracts (B, C, D, and E on Figure 5) are designated favorable for the occurrence of undiscovered precious- and base-metal vein deposits.

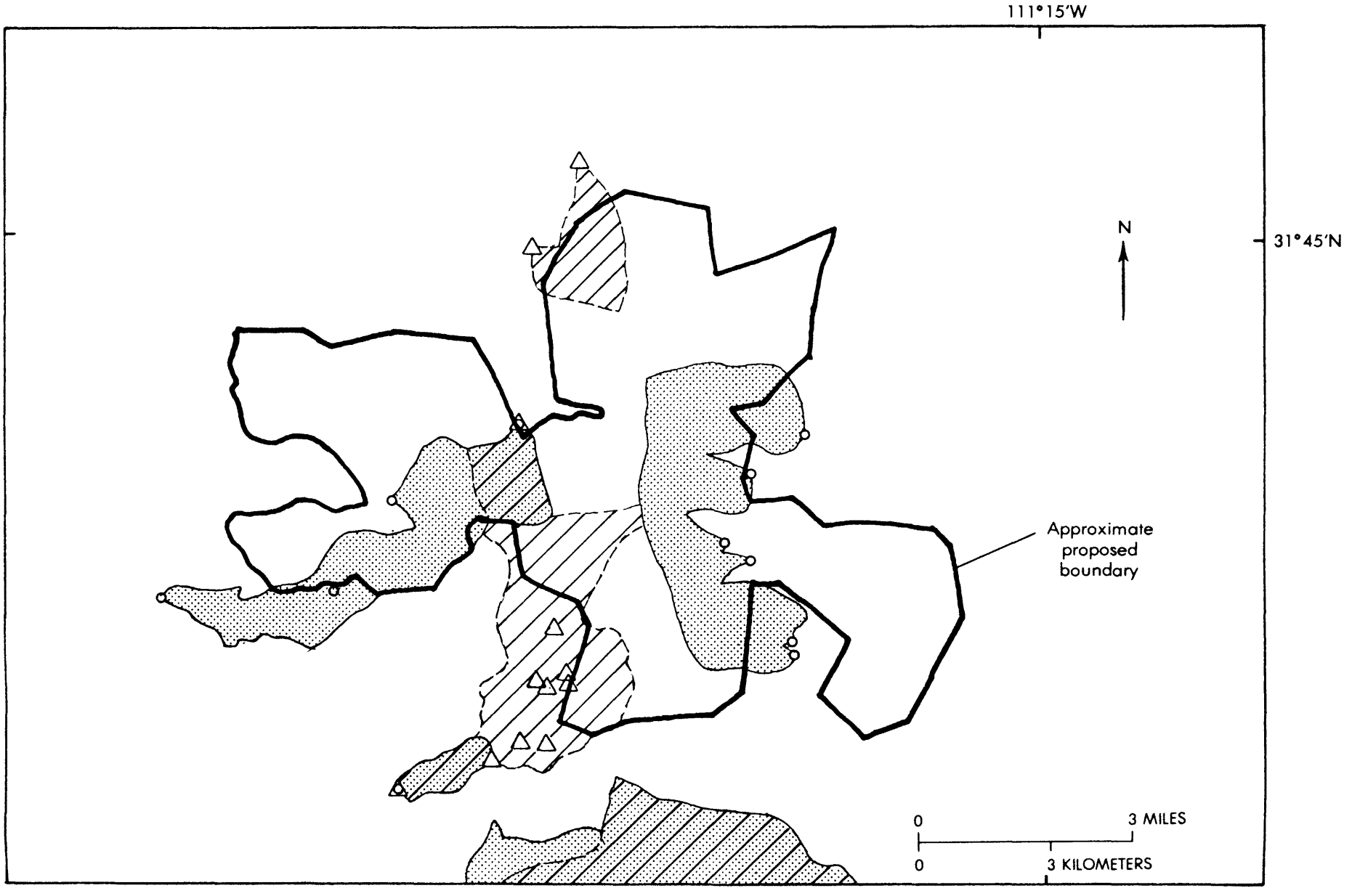

Figure 3. Geochemical map of the proposed Mt. Wrightson Wilderness

FIGURE 3

EXPLANATION

Drainage basin with anomalous (>75 ppm) concentration of lead and zinc

o Stream-sediment sample anomalous in lead and zinc

Drainage basin with anomalous (>75 ppm) concentration of copper

△ Stream-sediment sample anomalous in copper

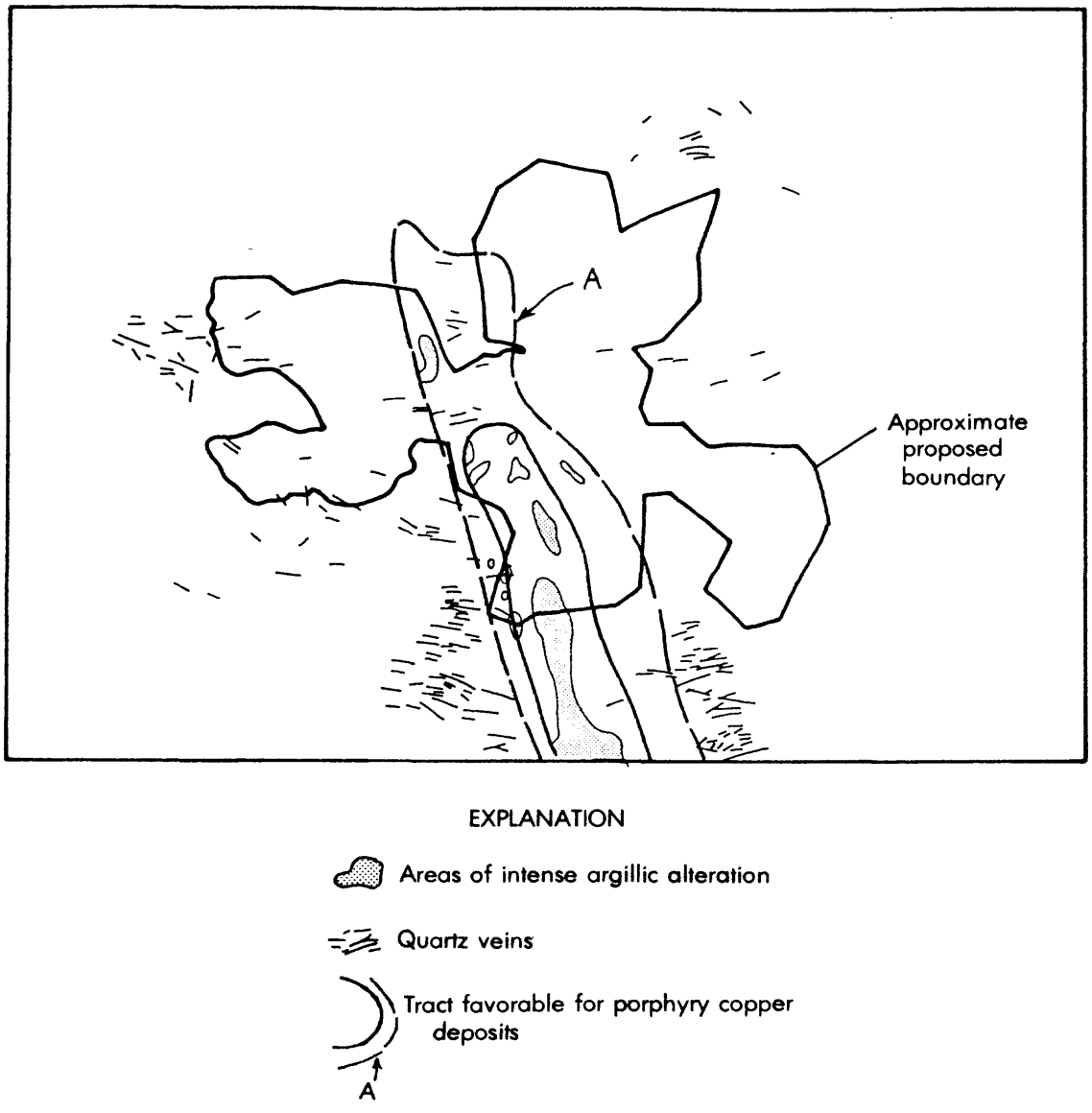

Figure 4. Sketch map showing tracts favorable for porphyry copper deposits

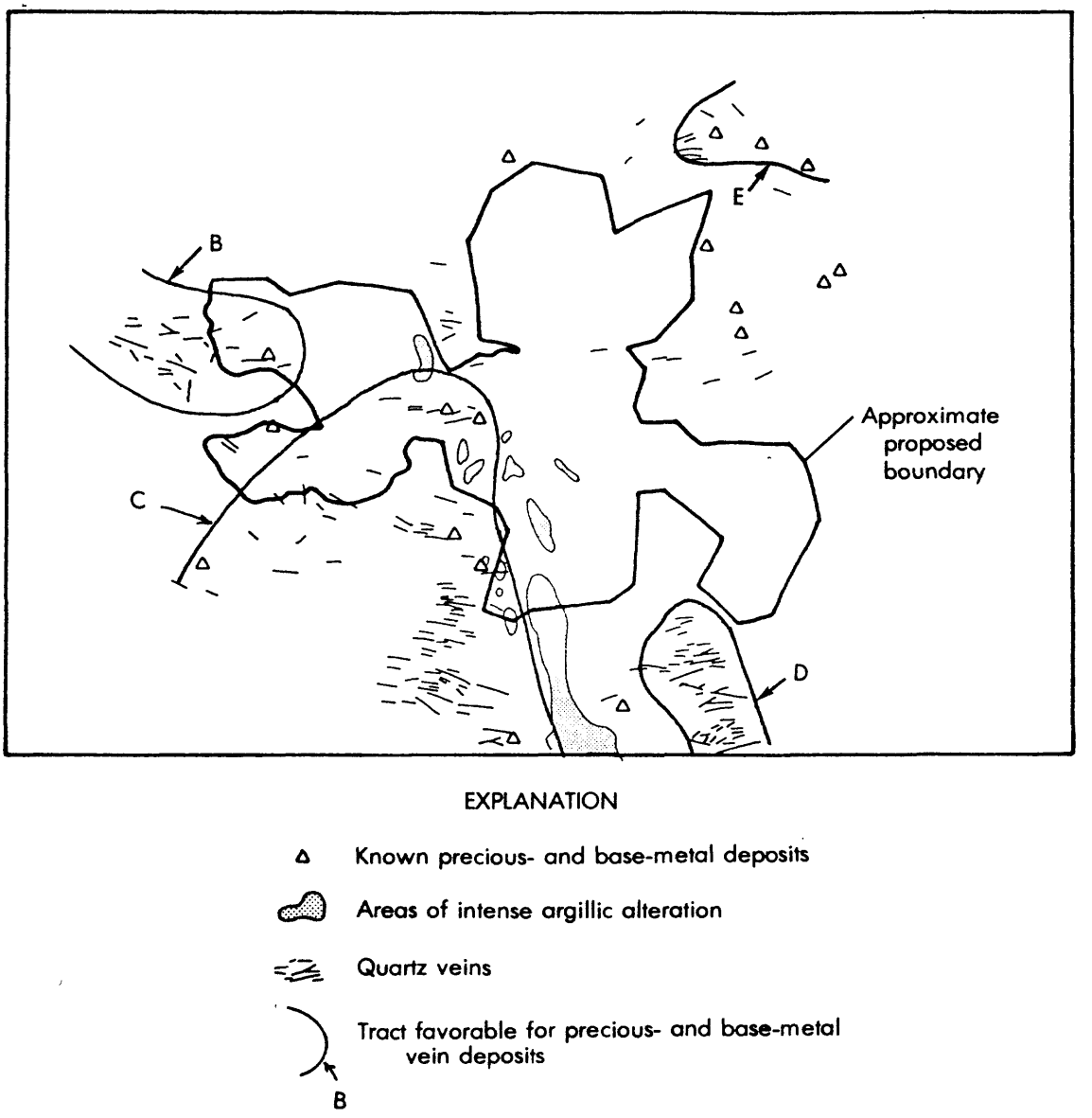

Figure 5. Sketch map showing tracts favorable for precious- and base-metal vein deposits

Tracts C and D are the two vein swarms peripheral to the postulated porphyry copper deposits. Tract C and the area to the south and southwest contain the mines that have provided the major part of the historic production from the area.

Tract B has no apparent explanation. Descriptions of these deposits are not substantially different from others in the area, but the veins are not spatially related to any other geologic features related to ore deposition.

Tract D, to the north, may well contain veins related to the southern edge of the Rosemont porphyry copper system.

RELATIVE IMPORTANCE OF DEPOSITS

It is important to take note of the relative significance of the two deposit types considered here. A typical porphyry copper deposit (Singer and Mosier, 1984) contains several hundred times the amount of copper, gold, and silver that has been mined from all the precious- and base-metal vein deposits in the area. Thus, its potential occurrence has more significance.

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