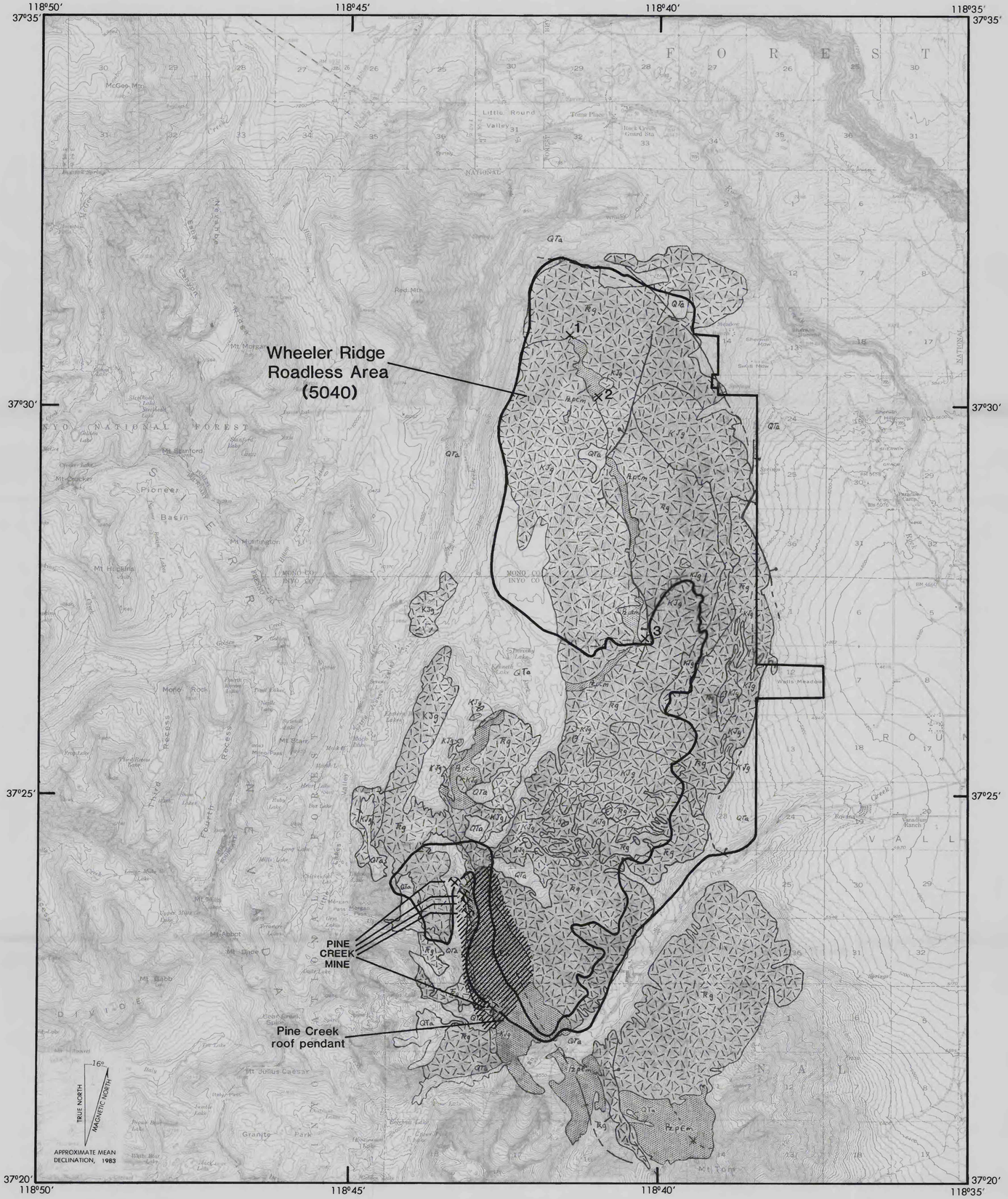
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1411-B



Base from U.S. Geological Survey, 1:62,500, Casa Diablo Mtn., Mt. Abbot, Mt. Morrison, 1953; Mt. Tom, 1949.

SCALE 1:62500

1 1 0 1 2 3 4 MILES
3000 0 3000 6000 9000 12000 15000 18000 21000 FEET
1 5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 80 FEET

Geology from Langenheim and others (1982) and Bateman (1965).

EXPLANATION

MINERAL RESOURCE POTENTIAL--Area of low to moderate resource potential for tungsten and (or) base and precious metals

CORRELATION OF MAP UNITS

Sedimentary and volcanic deposits

QTa | QTv — QUATERNARY AND TERTIARY

Plutonic rocks

KJg — CRETACEOUS AND (OR) JURASSIC

Rg — TRIASSIC

Metamorphic rocks

PzPcm — PALEOZOIC AND PRECAMBRIAN(?)

DESCRIPTION OF MAP UNITS

Sedimentary and volcanic deposits

QTa — ALLUVIAL DEPOSITS (QUATERNARY AND TERTIARY)--Unconsolidated sand, silt, and gravel. Includes alluvial fans, talus, and glacial moraines

QTv — VOLCANIC ROCKS (QUATERNARY AND TERTIARY)--Basalt and andesitic lava flows and andesitic to rhyolitic tuffaceous rocks. Includes the Bishop Tuff

Plutonic rocks

KJg — GRANITIC ROCKS (CRETACEOUS AND (OR) JURASSIC)--Fine-to coarse-grained porphyritic diorite to alaskite, mostly granodiorite and quartz monzonite. Includes the Round Valley Peak Granodiorite, the Lamarck Granodiorite, and other unnamed plutons

Rg — GRANITIC ROCKS (TRIASSIC)--Medium-light-gray medium-grained porphyritic quartz monzonite. Includes the Tungsten Hills Quartz Monzonite and the Wheeler Crest Quartz Monzonite

Metamorphic rocks

PzPcm — METAMORPHIC ROCKS (PALEOZOIC AND PRECAMBRIAN(?))--Include mica schist, phyllite, hornfels, calc-hornfels, tactite, marble, slate, metachert, quartzite, and other metamorphic-rock types. The stratigraphic sequence can be determined in some places; elsewhere, structural complexity and recrystallization obscure stratigraphic relations

CONTACT

FAULT--Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side

SYNCLINE

MINE

PROSPECT

APPROXIMATE BOUNDARY OF ROADLESS AREA

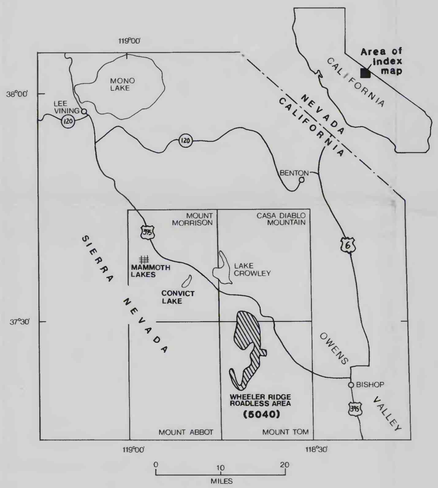


Figure 1.–Index map of east-central California showing location of the Wheeler Ridge Roadless Area and the 15-minute quadrangles that cover the area

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral resource potential survey of the Wheeler Ridge Roadless Area in Inyo National Forest, Inyo and Mono Counties, California. The Wheeler Ridge Roadless Area (5040) was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

SUMMARY

Geologic and geochemical investigations were conducted to evaluate the mineral resource potential of the Wheeler Ridge Roadless Area, Inyo and Mono Counties, Calif. Several drainages within the south boundary of the roadless area contain anomalous concentrations of selected elements that indicate a potential for the occurrence of mineral resources. The geologic setting is considered to be favorable for tungsten mineralization in tactite deposits along the margin of the Pine Creek roof pendant in the southern part of the roadless area. Because of this favorable setting and the proximity to the Pine Creek mine, these areas are considered to have a low to moderate resource potential for tungsten and (or) base and precious metals. These drainages, however, may have been contaminated by nearby mines and haulage roads, which possibly contributed to the anomalous values in the samples.

INTRODUCTION

The Wheeler Ridge Roadless Area, covering about 16,200 acres in Inyo National Forest, lies on the east side of the Sierra Nevada, 17 mi northwest of Bishop and 20 mi southeast of Mammoth Lakes, Calif. The area is accessible by unpaved dirt and gravel roads from U.S. Highway 395. The roadless area, which lies between 4,880- and 13,748-ft elevation, is semiarid and sparsely covered with sagebrush, juniper, pinon pine, and limber pine.

Geochemical sampling and prospect examination of the Wheeler Ridge Roadless Area were done by the U.S. Geological Survey (USGS) and the U.S. Bureau of Mines (USBM) in the summers of 1980, 1981, and 1982.

GENERAL GEOLOGY

The Wheeler Ridge Roadless Area contains a variety of igneous, metamorphic, and sedimentary rocks, ranging in age from Precambrian(?) to Holocene. The Paleozoic rocks of the area consist of a thick miogeosynclinal sequence composed mainly of limestone, dolomite, shale, and sandstone. The area has undergone considerable deformation and metamorphism by granitic intrusive bodies of Mesozoic age that make up part of the Sierra Nevada batholith. The Paleozoic metasedimentary and Mesozoic plutonic rocks are overlain unconformably by small erosional remnants of Pliocene(?) andesitic rocks and by Pleistocene rhyolitic-tuff deposits.

Glacial deposits of Pleistocene age occur as well-defined moraines at the mouths of major canyons and as isolated erratics and small patches of till and on some upland surfaces. Alluvial and colluvial deposits of Pleistocene and Holocene age are present on the valley floors, mainly as alluvial fans.

Major structural features of the area are of pre-Cenozoic and Cenozoic ages. The pre-Cenozoic structures are related to prebatholithic regional deformation of the sedimentary sequence. The major feature is a homoclinal westward-dipping sequence of sedimentary strata making up the Pine Creek roof pendant.

Major faults of Cenozoic age are high-angle normal faults related to the Sierra Nevada uplift. The oldest faults cutting Cenozoic rocks are probably Pleistocene, as suggested by displacement of late Cenozoic diamicton deposits. Post-Pleistocene movement along the Hilton Creek and Laurel-Convict faults northwest of the roadless area is evidenced by recent scarps formed during the 1979, 1980, 1981, and 1982 earthquakes. The most current and comprehensive discussions of the geology and ore deposits of the Wheeler Ridge Roadless Area were by Rinehart and Ross (1956, 1957, 1964) and Bateman (1965). The geology of the roadless area was summarized by Langenheim and others (1982).

GEOCHEMICAL STUDIES

Samples of rock, stream-sediment, and heavy-mineral concentrate were collected and analyzed by the USGS for 31 elements (silver, arsenic, gold, boron, barium, beryllium, bismuth, calcium, cadmium, cobalt, chromium, copper, iron, lanthanum, magnesium, manganese, molybdenum, niobium, lead, antimony, scandium, tin, strontium, thorium, titanium, vanadium, tungsten, yttrium, zinc, and zircon), using a six-step semiquantitative emission-spectrographic method (Grimes and Marranzino, 1968). Rock and stream-sediment samples were also analyzed for zinc by atomic-absorption spectrometry (Ward and others, 1969), and some of these samples were analyzed for gold by the same technique (Meier, 1980). In addition, stream-sediment samples were analyzed for uranium, using a modification of the fluorometric method of Centanni and others (1956). The geochemical data are listed by Cosca and Chaffee (1983).

Rock samples collected by the USBM at prospects were fire assayed for gold and silver, analyzed for tungsten by induction-coupled argon plasma spectroscopy, and for base metals by atomic-absorption methods. Analyses of the samples were used to indicate qualitatively the presence or absence of certain metallic elements. The results were then used to calculate resources at mines, prospects, and mineralized outcrops or to indicate areas of site-specific mineral resource potential.

Analyses of rock samples provide information on the normal, or background, levels of chemical abundances in the area. Analyses of stream sediment provide information regarding chemical concentrations of eroded rock material in the drainages upstream from each sample site. Heavy-mineral-concentrate samples provide information on a limited number of minerals, many of which are commonly related to mineralization.

For rock samples, six elements (silver, gold, copper, molybdenum, tungsten, and zinc) were selected as possibly related to mineralization. For the same reason, 10 elements (silver, arsenic, gold, barium, bismuth, copper, molybdenum, lead, tungsten, and zinc) were selected for investigation in the stream-sediment samples. In the concentrate samples, 11 elements (silver, arsenic, gold, barium, bismuth, copper, molybdenum, lead, uranium, tungsten, and zinc) were selected as possibly related to mineralization. Two elements (cobalt and iron) were selected as possibly related to hydrothermal alteration (pyritization) but not necessarily to mineralization.

The roadless area was divided into drainage basins, and the chemical analyses studied to determine anomalous concentrations of any of the selected elements. A numerical score was assigned to elements with anomalous concentrations, and the sum of these scores was used to provide a basis for evaluation of the mineral resource potential. Drainage basins with the highest total scores represent the areas of greatest mineral resource potential.

MINERAL RESOURCE POTENTIAL

Several drainages at least partly within the Wheeler Ridge Roadless Area contain anomalous concentrations of silver, arsenic, barium, bismuth, copper, molybdenum, lead, tungsten, and zinc; these results suggest a low to moderate potential for mineral resources. This suite of anomalous metals is common to hydrothermal ore deposit and may indicate contact-metamorphic skarn deposits and (or) base-and precious-metal vein deposits. The probable source of the anomalies is the Pine Creek roof pendant, which crops out in the southern part of the study area. This roof pendant is host to the Pine Creek mine deposits, which have produced significant amounts of tungsten as well as accessory molybdenum, copper, silver, and gold (Newberry, 1982).

Because of the geologic similarity and proximity to Pine Creek, the metamorphic rocks in the roadless area, particularly the skarns, are considered to have at least a low resource potential for tungsten mineralization. The prospect east of Round Valley Peak has tungsten occurrences in skarns and thus falls within this category.

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MINERAL RESOURCE POTENTIAL MAP OF THE WHEELER RIDGE ROADLESS AREA, INYO AND MONO COUNTIES, CALIFORNIA

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Explanatory pamphlet accompanies map

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