

**MINERAL RESOURCE POTENTIAL OF THE MOUNT HENRY ROADLESS AREA,
LINCOLN COUNTY, MONTANA**

By

R. E. Van Loenen, D. F. Siems, and Viki Bankey
U.S. Geological Survey
and
M. D. Conyac, U.S. Bureau of Mines

STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and related acts, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Mount Henry Roadless Area (U.S. Forest Service area 01666), Kootenai National Forest, Lincoln County, Montana. The area was proposed for study by the Montana Wilderness Study Bill, April 1976.

**MINERAL RESOURCE POTENTIAL
SUMMARY STATEMENT**

A small area located along the southwest boundary of the roadless area was identified as having a low mineral resource potential for copper and silver. Two formations present within the area contain economic deposits elsewhere in the Belt basin: the Prichard Formation near Kimberley, British Columbia, 60 mi to the north, is host for major lead-zinc deposits exploited by the Sullivan mine, and the Revett Formation in the Spar Lake district 55 mi to the south contains copper and silver deposits. Minor amounts of base and precious metals have been produced from veins and placers several miles southwest and southeast of the roadless area, but this investigation revealed no evidence of a potential for the occurrence of deposits of metalliferous minerals or coal, oil and gas, or geothermal resources within the roadless area.

Gravity and aeromagnetic surveys do not show any evidence of mineralized rock. There are no mines, prospects, or records of mineral production within the roadless area.

INTRODUCTION

Location and topography

The Mount Henry Roadless Area (U.S. Forest Service area 01666) lies within the Kootenai National Forest in Lincoln County, Mont., and is approximately 36 mi north of Libby, Mont. (fig. 1). The area covers 23,000 acres of heavily forested Purcell Mountains within the drainage basin of the Kootenai River. Elevations range from 3,400 ft along the Yaak River to 7,200 ft on Mount Henry. Thick accumulations of glacial debris cover much of the area. Bedrock is exposed mostly on the high ridges, along some stream drainages, and in recent logging roadcuts. Extensive logging operations have taken place adjacent to the study area, and many of the roads constructed for these operations are maintained and provide easy access to most of the area. Trails are limited within

the area; many shown on topographic maps (1963) are in poor condition and difficult to locate. The area is accessible from State Highway 508 north of Troy, Mont., or by the Pipe Creek Road north of Libby, Mont.

Previous studies

The geology of Flathead and Lincoln counties, Mont., which includes the Mount Henry Roadless Area, was studied by Johns (1970), who published a regional reconnaissance map and brief description.

Present investigation

The geology of the Mount Henry Roadless Area was mapped and rock units sampled by R. E. Van Loenen and G. A. Wadsworth of the U.S. Geological Survey in June through August 1981. Stream

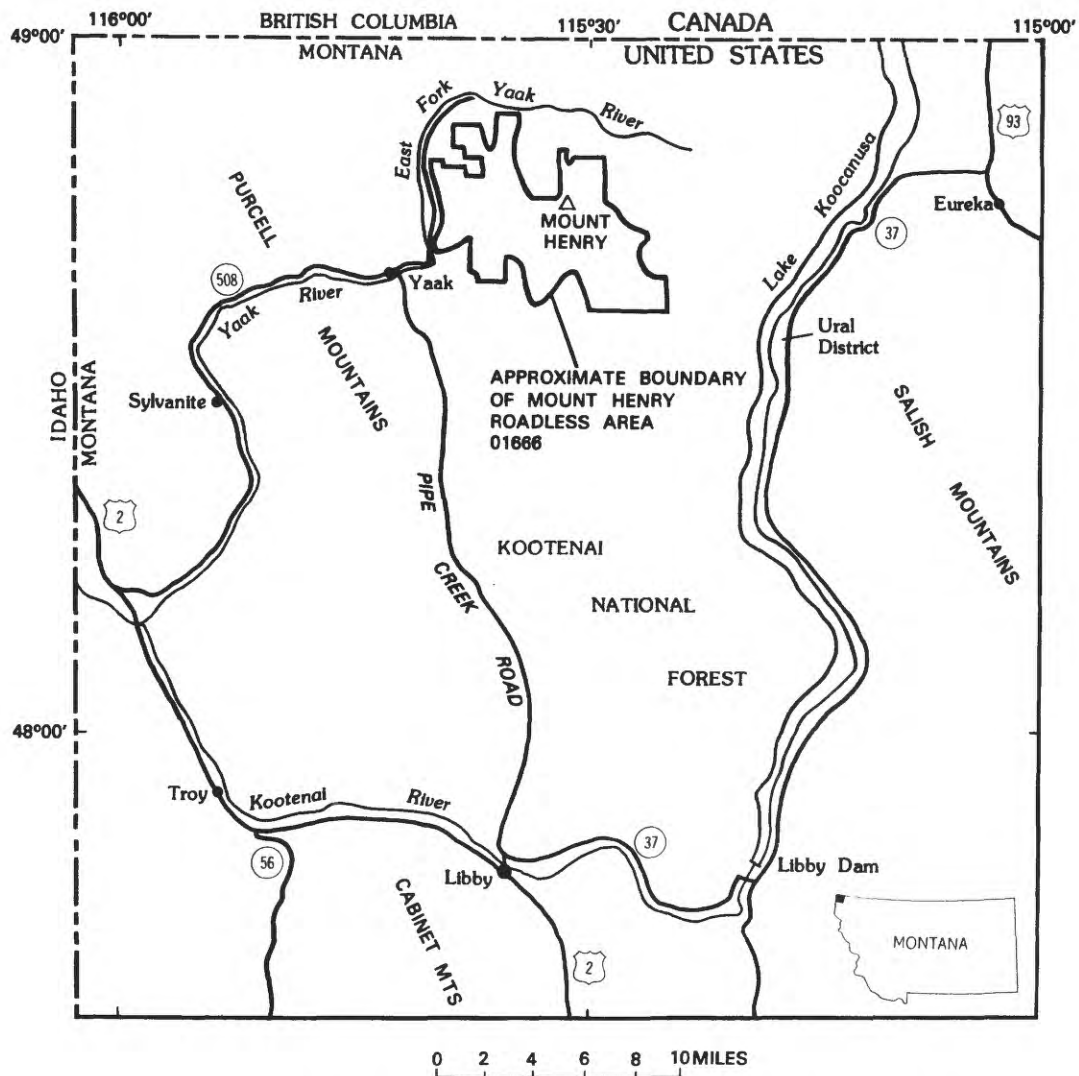


Figure 1.--Index map showing location of the Mount Henry Roadless Area (01666), Lincoln County, Montana

sediments were sampled by D. F. Siems and R. W. Leinz during July 1981. Gravity, aeromagnetic, and audio-magnetotelluric surveys were done by Viki Bankey, M. D. Kleinkopf, and D. B. Hoover of the U.S. Geological Survey.

A courthouse record search and an on-site inspection of nearby mining properties were conducted for the U.S. Bureau of Mines by M. D. Conyac.

Acknowledgments

We thank David Fisher, District Ranger for the Yaak Ranger District, Troy, Mont., for his assistance and cooperation.

GEOLOGY

Low-grade metasedimentary rocks of the Belt Supergroup (Proterozoic Y age) underlie the study area. A sedimentary rock section nearly 16,000 ft thick, from the middle member of the Helena Formation and its equivalent, the Wallace Formation, to the lower part of the Prichard Formation, is exposed. The rocks consist of fine- to very fine grained argillite, siltite, quartzite, and recrystallized limestone. The Revett and Prichard Formations are host for economic deposits of strata-bound copper-silver and lead-zinc mineralization in other parts of the Belt basin. The Belt rocks of this region are thought to be an allochthonous part of an extensive fold and thrust belt that has been transported eastward many kilometers across coeval autochthonous rocks in the cordillera of Idaho, Montana, and southern Canada (Harrison and others, 1980). The roadless area is underlain by a broad anticline nearly bisected by a north-trending thrust fault. The area is also transected by a series of north- to northwest-trending high-angle faults, some with as much as 2,000 ft of displacement. Traces of mineralization are found along some of these faults. No intrusive rocks were identified within the roadless area. A geologic map, cross section, and text describing the geologic setting, structure, and rock units is in Van Loenen (1983).

GEOCHEMISTRY

A geochemical survey of the Mount Henry Roadless Area disclosed randomly scattered, weakly anomalous concentrations of metals, but did not identify any significantly mineralized zone. The sampling program was especially designed to identify copper and silver in the Ravalli Group, lead and zinc in the Prichard Formation, and gold-bearing veins or placers. Ninety-five rock samples, 65 stream-sediment samples, and 11 panned concentrates were analyzed spectrographically for 31 elements. Selected samples were analyzed for additional elements by other methods. Sample localities and analyses are shown on geochemical maps of the Mount Henry Roadless Area (Seims and others, 1983).

GEOPHYSICS

A gravity anomaly map (Bankey and others, 1983) is dominated by a north-northwest-trending positive anomaly that reflects a northern extension of the

Purcell anticlinorium. This large regional feature extends almost 80 mi southeast of the Mount Henry Roadless Area. Because most rocks of the Belt Supergroup have approximately the same density, the gravity survey was unable to distinguish many local structures.

The aeromagnetic map (Bankey and others, 1983) is dominated by two major linear positive anomalies. These north-northwest-trending anomalies correspond to exposed ridges of Burke and Revett rocks, which contain significant amounts of magnetite. North-northwest-trending negative anomalies parallel these ridges and are associated with outcrops of upper transitional Prichard rocks. A broad, low-amplitude, positive anomaly between the two major Burke-Revett ridges falls in the region of a faulted anticline.

Audio-magnetotelluric soundings (Bankey and others, 1983) suggest a conductor zone beneath the roadless area; however, its origin or significance is unknown.

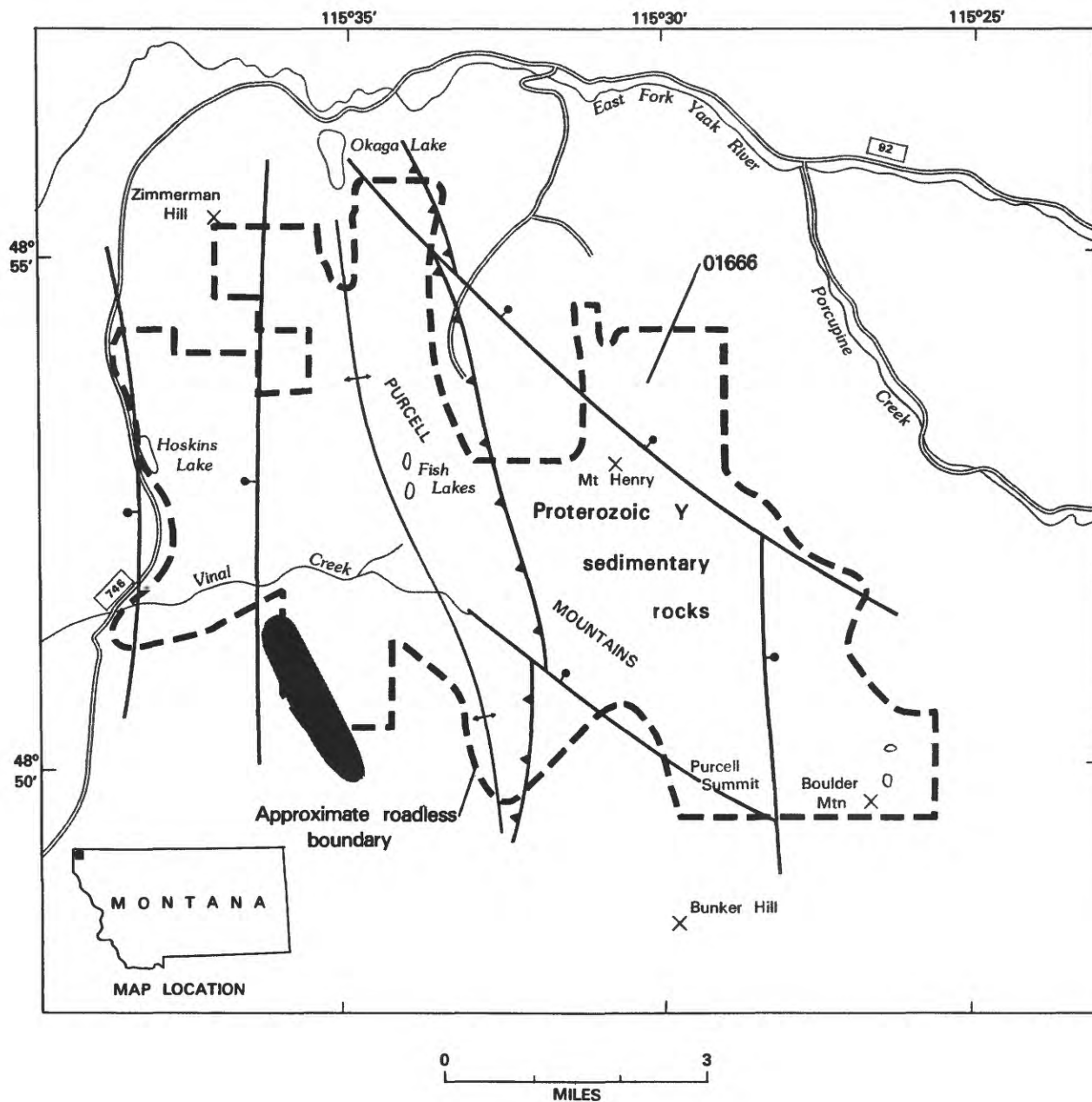
MINING DISTRICTS AND MINERALIZATION

The U.S. Government owns all surface and mineral rights in the Mount Henry Roadless Area. No mines, evidence of prospecting, or mineralization were seen in the roadless area during this investigation. The area is near the Yaak (Sylvanite) district, which is centered 25 mi to the southwest. The Yaak district claims date from 1906 when C. E. Perrault staked several placer claims along the East Fork of Yaak River and along creeks on the northwest slopes of Mount Henry. A few other claims were staked there in 1914, the 1920's, and 1930's. Only one claim that could be within the roadless area boundary was noted in county courthouse records; however, the location description was not specific enough for the claim to be located in the field. Reported production from the Yaak district totaled 22,500 tons of ore, valued at \$251,600 in 1937, from iron-copper-lead sulfides and native gold in quartz veins in argillite and quartzite of the Prichard Formation and Ravalli Group. Nearly all production was from the Sylvanite mine that operated prior to 1937 (Johns, 1970). The Ural district, which lies 15 mi southeast of the map area, has about seven lode and three placer properties. Production is reported as small, possibly only a few hundred tons (Johns, 1970).

Traces of metallic minerals have been reported in float found in the upper part of Hudson Creek Valley on the northwest side of Mount Henry (Johns, 1970).

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The Mount Henry Roadless Area is underlain by at least two formations that elsewhere in the Belt basin host economic deposits of copper-silver and lead-zinc. Similar deposits were looked for within the Mount Henry Roadless Area but none was found. Therefore, only a low potential for mineral resources of this type can be assigned to this area. Several prospects and a few productive mines are located on fault structures in adjacent areas, and some of these structures extend into the Mount Henry Roadless Area. Only a few randomly scattered samples containing slightly anomalous concentrations of metals



EXPLANATION

- Geologic terrane with low mineral-resource potential
- Fault--Bar and ball on downthrown side
- Thrust fault--Sawteeth on upper plate
- Anticline

Figure 2.--Map showing mineral resource potential of the Mount Henry Roadless Area, Lincoln County, Montana

(Siems and others, 1983) were found along these structures, indicating a low mineral resource potential.

Copper-silver

The Revett Formation hosts strata-bound occurrences of copper and silver at several localities in the western part of the Belt basin. One mine in the Spar Lake district south of Troy, Mont., and 55 mi south of the study area, is currently producing copper-silver ore that averages 0.7 percent copper and 1.5 ounces of silver per ton (Bureau of Mines, 1982).

The Mount Henry area lies just north of a "western sulfide belt" (including the Spar Lake district) described by Harrison (1972) as an area favorable for strata-bound copper-silver deposits. The Revett Formation, which elsewhere hosts these deposits, is well exposed on prominent ridges in the roadless area. No indications of mineralization were seen in outcrop, or in the 30 rock samples collected and analyzed. Only one sample contained an anomalous amount of copper (70 ppm) and the highest copper value from any stream-sediment sample was 70 ppm.

Minor amounts of copper- and silver-bearing minerals occur in the uppermost part of the upper member of the Burke Formation just outside the area boundary, along Yodkin Creek (southwest part of map). Host rocks for these occurrences are green and purple siltite interlayered with thin light-gray quartzite and calcareous argillite. Bornite (Cu_5FeS_4) is the primary copper mineral, with secondary malachite $\text{Cu}_2\text{CO}_3(\text{OH})_2$ coating fracture surfaces. This occurrence is only a few centimeters thick and probably is not laterally extensive. Channel samples collected several feet above and below the copper zone contain only trace amounts of copper. The Yodkin Creek area and its extension into the roadless area have a low mineral resource potential for copper and silver (fig. 2). Small strata-bound occurrences such as this are not uncommon in Ravalli Group rocks throughout the Belt basin, and none within the Burke Formation is known to be economic.

Lead-zinc

Strata-bound lead-zinc mineral occurrences are known in lower Belt rocks approximately 60 mi north of the Mount Henry area near Kimberley, British Columbia. High-grade lead-zinc ore is being mined from the lower part of the middle member of the Aldrige Formation (Canadian equivalent to the lower Prichard) at the Sullivan Mine (Morris and others, 1972). The Sullivan type mineralization, if found in the Mount Henry area, would occur several thousand feet below the surface and stratigraphically well below exposures of the lower Prichard. This stratigraphic horizon is exposed a few miles west of the map area where it contains no known deposits of lead and zinc minerals.

Gold

Gold was not found in any stream-sediment samples or concentrates collected from the area of the

early placer claims. Only one stream-sediment sample collected from Vinal Creek, west of the area, contains detectable gold. It is possible that this trace amount of gold could be reworked from the thick, glacial debris present at the sample site.

Oil and gas

The oil and gas potential of the Mount Henry Roadless Area is unknown. Phanerozoic source rocks could be present beneath the thrust fault that underlies the allochthonous Proterozoic rocks of the area, but this possibility is considered unlikely. No drilling has been done anywhere in the region.

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