



Base from U.S. Geological Survey 1:250,000, Hamilton, 1966, revised, 1969; Elk City, 1956, limited revision, 1964.

CORRELATION OF MAP UNITS

Ts	Eocene	TERTIARY
Tk	Paleocene and TERTIARY AND (OR)	
Tg	Upper Cretaceous	
Tk	CRETACEOUS	
Ys	PROTEROZOIC (?)	

DESCRIPTION OF MAP UNITS

Ts GRANITIC PLUTONS (Eocene)-Bipolar, medium- to coarse-grained, massive, hornblende-biotite monzonitic and syenitic.

Tk PARADISE PLUTON OF THE BITTERROOT LOBE OF THE IDAHO BATHTUB (PALEOCENE AND OR) UPPER CRETACEOUS-Mesozoic, fine- to medium-grained, foliated, hornblende-biotite monzonitic to monzonitic.

Tg GRANITIC PLUTONS OF THE BITTERROOT LOBE OF THE IDAHO BATHTUB (PALEOCENE AND OR) UPPER CRETACEOUS-Mesozoic, medium- to coarse-grained, foliated, muscovite-biotite monzonitic and quartz dioritic.

Ys TONALITE AND QUARTZ DIORITE PLUTONS OF THE BITTERROOT LOBE OF THE IDAHO BATHTUB (CRETACEOUS)-Mesozoic, fine- to medium-grained, foliated, hornblende-biotite monzonitic and quartz dioritic.

Ym MIDWEST (PROTEROZOIC)-Mesozoic, coarse-grained, foliated, hornblende-biotite monzonitic and quartz dioritic.

Ys CALC-SILICATE GNEISS, QUARTZITE, AND GNEISS (PROTEROZOIC Y?)

INTRODUCTION

The Selway-Bitterroot Wilderness comprises approximately 1.25 million acres (5 million hectares) in eastern Idaho and western Montana (fig. 1). The mineral resource potential of the wilderness was evaluated in 1976 and from 1978 to 1981. The Bureau of Mines was responsible for determining the resource of mines, prospects, and mineralized areas and the U.S. Geological Survey was responsible for geological, geophysical, and geophysical investigations. The wilderness lies across the Bitterroot Range and includes large parts of the drainage basins of the Selway, Lochsa, and Bitterroot Rivers. Elevations range from 1,800 ft (550 m) on the Selway River to 12,157 ft (3,706 m) at Trapper Peak in the Bitterroot Mountains. Cities within 50 mi (80 km) of the wilderness include Missoula, Hamilton, and Salmon on the east and Oshana and Grangeville on the west. The ID-0000000 (1:50,000-scale) National Corridor area southeast of the wilderness was added to the wilderness by Public Law 96-311 in 1979 and is not included in this study.

GEOLOGY, GEOMORPHOLOGY, AND GEOPHYSICS

Geologic setting

The Selway-Bitterroot Wilderness encompasses a major part of the Bitterroot lobe of the Idaho batholith. Foliated hornblende-biotite tonalite and quartz diorite of Cretaceous age form much of the western border of the Bitterroot lobe and are found along the northern border on isolated plateaus (not shown on map). Tertiary and (or) Cretaceous monzonitic monzonitic granodioritic to monzonitic forms the major part of the lobe and intrudes the tonalite in the west, southeast, and north. In many places, complex sigmoidal terranes separate the tonalite from granodioritic to monzonitic plateaus and involve parts of Proterozoic (?) and possible older metamorphic rocks.

During a period of extensional tectonics in Eocene time, massive regional highly differentiated subalkalic granitic to syenitic plutons were emplaced along the southern, southwestern, and northern parts of the Bitterroot lobe. The plutons are pink, coarse-grained, and contain quartz, biotite, and fluorite in a silicatic matrix, and commonly have granitic textures. Extensional tectonics related to rhyolitic dikes extend outward from each of the plutons and crosscut all other lithologic units.

A steep normal fault borders the eastern and southeastern margins of the Bitterroot lobe and separates the granitic rocks of the batholith to the west from the younger plutons to the east. Northwest-trending thrust faults of small displacement crosscut the monzonitic monzonitic to granodioritic rocks in the western parts of the Bitterroot lobe. Northwest-trending, high-angle, normal and strike-slip faults crosscut rock units of all ages and have effects of as much as 125 mi (200 m).

Geochronology

A geochronology survey of the wilderness was done by the U.S. Geological Survey in 1976 and from 1978 to 1981, by using zircon, monazite, and apatite for chemical analysis. The results of the geochronology survey are given in detail by Cox and others (1983). In general, rocks in the Selway-Bitterroot Wilderness are lacking in radiometric dates. A few areas within the wilderness contain anomalous concentrations of certain mineralizing elements in stream-aqueduct samples from adjacent or nearby streams. Such clusters of anomalous elements are localized elemental enrichment, but no geologic source could be identified.

Rock samples from three localized areas of mineralization and (or) alteration exhibit striking geochemical anomalies. These include an altered and brecciated zone at Trout Peak and Trout Creek (on map), a gneiss and quartzite zone on a hatched area (on map), and Ag- and Pb- and Cu-bearing breccia zones on the north side of Whistling Pig Peak (on map). Stream-aqueduct samples from these areas show no geochemical anomalies.

Major-element chemistry (Koster and others, 1982) of rocks of the Whistling Pig, Running Creek, and Painted Rocks plateaus is similar to that of rocks geologically related to monzonitic deposits in granite (Natchez and others, 1981). Stream-aqueduct data indicate a broad enrichment in Sr, Ba, W, Y, Pb, and Th, especially in the Running Creek plateau. However, the complex nature and porphyritic textures of the rocks associated with granitoid-monzonitic deposits are notably absent. Geochemical analyses of rock samples found only two samples with detectable Ni or other mineralizing elements. Detailed surface mapping failed to locate any alteration patterns characteristic of hydrothermal mineralization. For these reasons, potential for a granite-monzonitic deposit is low.

MINERAL RESOURCE POTENTIAL

Several factors suggest that the Whistling Pig, Running Creek, and Painted Rocks plateaus may have favorable characteristics for hydrothermal mineralization (Cox, 1976, and 1983). Major-element chemistry (Koster and others, 1982) is comparable to that of other plateaus geologically related to granite-monzonitic deposits (Natchez and others, 1981). Stream-aqueduct data also indicate an enrichment in Sr, Ba, W, Y, Pb, and Th, especially in the Running Creek plateau. However, the complex nature and porphyritic textures of the rocks associated with granitoid-monzonitic deposits are notably absent. Geochemical analyses of rock samples found only two samples with detectable Ni or other mineralizing elements. Detailed surface mapping failed to locate any alteration patterns characteristic of hydrothermal mineralization. For these reasons, potential for a granite-monzonitic deposit is low.

Geophysical survey

Data from magnetic and gravity surveys (Kleinke and others, 1980) are not widely spaced to detect subtle variations in magnetization and (or) alteration of the localized areas of mineralization and (or) alteration. Magnetic anomalies are weak, and magnetic anomalies in the Whistling Pig, Running Creek, and Painted Rocks plateaus are indistinctive magnetic anomalies. However, the Running Creek plateau correlates somewhat with a broad northeast-trending gravity low, and widely spaced gravity data suggest that the plateau could extend to the northeast beneath older granitic rocks.

MINERAL RESOURCE POTENTIAL

Although major mining activity has occurred on the periphery of the Selway-Bitterroot Wilderness, none is known within the wilderness area. Table 1 gives the locations and resource data of all mines, prospects, and mineralized areas in and near the wilderness. Investigations indicate that five areas within the wilderness have low mineral resource potential.

Niobium

Subeconomic resources of niobium-bearing ilmenite occur in 5 million cubic feet (0.14 million m³) of alluvium in the Elk Summit area on the north edge of the wilderness. Because the titanium content (54 percent) of the ilmenite does not meet present market specifications (54 percent) and the niobium content is low, the deposit is considered to be subeconomic.

Nycthemeron

Several factors suggest that the Whistling Pig, Running Creek, and Painted Rocks plateaus may have favorable characteristics for hydrothermal mineralization (Cox, 1976, and 1983). Major-element chemistry (Koster and others, 1982) is comparable to that of other plateaus geologically related to granite-monzonitic deposits (Natchez and others, 1981). Stream-aqueduct data also indicate an enrichment in Sr, Ba, W, Y, Pb, and Th, especially in the Running Creek plateau. However, the complex nature and porphyritic textures of the rocks associated with granitoid-monzonitic deposits are notably absent. Geochemical analyses of rock samples found only two samples with detectable Ni or other mineralizing elements. Detailed surface mapping failed to locate any alteration patterns characteristic of hydrothermal mineralization. For these reasons, potential for a granite-monzonitic deposit is low.

Silver-lead-copper

About 100,000 tons of rock along a fault contains silver-lead-copper resources in small, randomly distributed breccia zones at the Cliff mine on the northeast side of the wilderness (on 25 on map). One breccia zone contains galena, chalcocite, sphalerite, barite, and tetrahedrite and contains as much as 7.3 oz Ag/Ton, 1.4 percent Pb, 1.1 percent Cu, and 0.5 percent zinc. Because the breccia zones are localized, the deposit is considered to be subeconomic.

Other resources

No geological evidence for oil, gas, coal, geothermal resources, or other energy-related commodities was found within the wilderness.

REFERENCES

Cox, S. W., and Toth, M. I., 1983, Geochronology of the Selway-Bitterroot Wilderness, Idaho County, Idaho, and Missoula and Ravalli Counties, Montana: U.S. Geological Survey Miscellaneous Field Studies Map MF-1495-C, scale 1:125,000.

Koster, M. E., Bertel, A. J., Hahner, H. N., Myers, J. W., King, R. S., and Grew, L. F., 1982, Major element X-ray fluorescence analyses of rock samples from the Selway-Bitterroot Wilderness, Idaho County, Idaho, and Missoula and Ravalli Counties, Montana: U.S. Geological Survey Open-File Report 82-1094, 36 p.

Natchez, P. L., Wight, E. G., Lindgren, S. B., and Abbott, J. T., 1981, Granite-monzonitic systems: Economic Geology, v. 76, p. 874-897.

Toth, M. I., 1983, Reconnaissance geologic map of the Selway-Bitterroot Wilderness, Idaho County, Idaho, and Missoula and Ravalli Counties, Montana: U.S. Geological Survey Miscellaneous Field Studies Map MF-1495-B, scale 1:125,000.

Table 1.—Mines, prospects, and mineralized areas numbered on map

Map No.	Name	Workings	Resource Data	Map No.	Name	Workings	Resource Data
1	Falls Point	None	Fault zone. Sample had 0.04 oz gold per ton	18	Clacter Falls	None	No anomalous sample values.
2	Kyanite occurrence	None	Kyanite in schist. Generally less than 1 percent.	19	Elk Summit	Several pits	Niobium-bearing ilmenite in alluvium. 5 million cubic feet (0.14 million m ³) of subeconomic resources.
3	Rhuda Creek placer	Several pits	Alluvium. No anomalous sample values.	20	Hig Sand Creek	None	Ilmenite in alluvium. Low potential.
4	Sunrise 1-4 placer	None	Alluvium. No anomalous sample values.	21	Kookonias	None	Alluvium. No anomalous sample values.
5	Sinora	None	Pyrite in granodiorite. No anomalous sample values.	22	George Clarke	None	Fracture zones contain minor gold.
6	Hig Run	1 pit	Granite. No anomalous sample values.	23	Searr	1 adit	Schist-granodiorite contact. Trace gold.
7	Oncho placer	None	Alluvium. Trace gold.	24	Great Eastern-Clear Lake	None	Fault zones with minor sulfides.
8	Painted Rocks pluton	None	Favorable characteristics for hydrothermal mineralization, but none discovered.	25	Cliff mine	2 adits	Fault with sulfide-bearing breccia zones. Subeconomic silver-lead-copper resources.
9	Fourth of July	None	Quartz veins with minor gold.	26	Oso Hurrae	2 adits	Shaw zones with sulfides. Samples contained minor gold and silver. 0.99 percent lead and 0.11 percent zinc.
10	Windridge	1 pit	Sulfides in quartz veinlets. Samples averaged 0.4 percent lead and 1.7 percent zinc.	27	Carlson Lake	None	Quartz veins. Samples had trace gold, silver, copper, zinc, and molybdenum.
11	Necktown 1-9 creek	Adit, several pits and trenches	Fault zones with trace silver, copper and zinc.	28	Running Creek pluton	None	Favorable characteristics for hydrothermal mineralization, but none discovered.
12	Nelle	None	Quartz veinlets. No anomalous sample values.	29	Whistling Pig pluton	None	Favorable characteristics for hydrothermal mineralization, but none discovered.
13	Mary Alice placer	None	Alluvium. No gold detected.	30	Trout Peak	None	Breccia and shear zone. Detectable molybdenum and zinc.
14	Trapper Creek	Several trenches	Autoclave along fractures.				
15	Golden Slipper placer	None	Alluvium. No gold detected.				
16	Fargson	None	Limonite in fractures. No anomalous sample values.				
17	Granite	None	No apparent potential.				

MINERAL RESOURCE POTENTIAL MAP OF THE SELWAY-BITTERROOT WILDERNESS, IDAHO COUNTY, IDAHO, AND MISSOULA AND RAVALLI COUNTIES, MONTANA

By
M. I. Toth and B. W. Cox, U.S. Geological Survey
and
N. T. Zilka and M. M. Hamilton, U.S. Bureau of Mines