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MINERAL RESOURCE POTENTIAL OF THE LONG SWAMP ROADLESS AREA, OKANOGAN COUNTY, WASHINGTON

SUMMARY REPORT

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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 Long Swamp Roadless Area (A6024), Okanogan National Forest, Okanogan County, Washington. The area 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 reveal low potential for metallic mineral deposits in Long Swamp Roadless Area (A6024). A small area (0.3 mi^2) of hydrothermally altered granitic rocks west of the Chewack River contains anomalous concentrations of copper, molybdenum, silver, zinc, and lead and possesses some—but by no means all—of the characteristics of porphyry-type copper-molybdenum deposits. A stream-sediment sample from Windy Creek contained measurable amounts of gold and silver, and another stream-sediment sample from Basin Creek contained anomalous amounts of copper and lead; the bedrock sources of the metals in these two samples have not been identified, but the restriction of the anomalous values to small drainage basins indicates that the mineralized source rocks cannot occupy a large area. A single vein of molybdenite+quartz located along the Chewack River about 1 mi south of the north boundary of the roadless area is unaccompanied by any other indications of mineralization and thus is not considered to represent resource potential.

Long Swamp Roadless Area contains no prospects, claims, or mines, nor are there any mineral, geothermal, or oil and gas leases in the vicinity; there is virtually no potential for such energy resources.

INTRODUCTION

The Long Swamp Roadless Area (A6024) comprises 15.9 mi^2 in the Okanogan Range of Okanogan County, Wash. The area lies about 6 mi south of the Canadian border and is bounded on its north and west sides by the Pasayten Wilderness (fig. 1). Access is via U.S. Forest Service Road 392 (West Chewack Road) north from Winthrop and Forest Service Road 390 (Long Swamp Road) west from Loomis. Elevations range from 3,500 ft at Thirtymile Campground on the Chewack River in the southwestern extremity of the roadless area to about 7,700 ft along the north border immediately south of Windy Peak.

The U.S. Geological Survey conducted geologic and geochemical surveys of the area in July and September 1982. The U.S. Bureau of Mines reviewed literature and courthouse records and examined the area in 1981.

GEOLOGY AND GEOCHEMISTRY PERTAINING TO MINERAL RESOURCE POTENTIAL

Geology

The geology of the Long Swamp Roadless Area is dominated by Mesozoic plutonic rocks. More than three-quarters of the area is underlain by the Cathedral Peak batholith (Daly, 1912), a homogeneous coarse-grained biotite leucogranite to trondhjemite body of Late Cretaceous age (Hawkins, 1968; Engels and others, 1976) that covers 240 mi^2 extending into British Columbia (Hawkins, 1968, 1969; Hibbard, 1971; Staatz and others, 1971). The Cathedral Peak batholith intrudes the Tillman Mountain pluton, a texturally and chemically variable unit that is typically gneissic and has an average composition of biotite-hornblende granodiorite (Hibbard, 1971; Rinehart, 1981). Intervening along the contact between the two plutonic bodies are thin zones of leucocratic, massive to foliated to migmatitic rocks. The origin of these latter units is unclear; they have been interpreted as septa of metasedimentary host rocks (Staatz and others, 1971) and as hybrid syntectonic intrusions (Hibbard, 1971; Rinehart, 1981).

A relatively small area of hydrothermal alteration occurs within the Cathedral Peak batholith near the west boundary of the Long Swamp Roadless Area (fig. 2, area A). The alteration is characterized by moderate to intense sericitization of feldspar accompanied by deposition of coarse quartz crystals in vuggy zones and veins, and minor pyrite with traces of chalcopyrite. The only other indication of mineralization noted was a single vein of molybdenite and quartz cropping out along the Chewack River about 1 mi south of the north boundary of the roadless area (fig. 2, area B).

Evidence for late Pleistocene glaciation (Staatz and others, 1971) is apparent in the relatively smooth and subdued

topography of the eastern half of the roadless area, the steep-walled U-shaped valley of the Chewack River, and a small but prominent terminal moraine on the Chewack River above Thirtymile Campground.

Geochemistry

Samples of bedrock, stream sediment, and panned concentrate were collected and analyzed by emission spectroscopy for elements potentially indicative of mineralization (Evarts and others, 1983). The most significant geochemical anomaly is associated with the area of hydrothermal alteration in the Cathedral Peak batholith west of the Chewack River (fig. 2, area A). All samples collected from that area contain anomalous concentrations of silver, copper, molybdenum, zinc, lead, arsenic, antimony, barium, strontium, boron, manganese, bismuth, and tungsten. Bedrock samples contained as much as 1,000 parts per million (ppm) copper, 20 ppm molybdenum, and 5 ppm silver. This suite of elements, the composition of the host rock, and the character of the hydrothermal alteration are all features typical of porphyry-type copper-molybdenum deposits. Furthermore, stream-sediment-sample sites within 2 mi north and south of the altered area show relatively high levels of barium, manganese, and (or) bismuth, elements commonly found in geochemical halos around porphyry copper deposits.

Areas C and D are drainage basins containing geochemically anomalous stream sediments. At one sample site on Windy Creek (fig. 2, area C), the panned-concentrate sample contained visible flakes of gold, and analysis showed 500 ppm gold and 300 ppm silver. The source of these elements is unknown. The Windy Creek drainage basin upstream from the sample site is entirely within the Cathedral Peak batholith, and analysis of a rock sample from the sample site revealed no anomalous values.

Panned concentrate from a sample site on Basin Creek (fig. 2, area D) contained 150 ppm lead, 50 ppm copper, and visible pyrite. However, sediment samples collected nearby do not show anomalous values, indicating that the source area of the lead and copper in the stream sediment is quite limited.

Several other samples contain anomalous amounts of one or more elements, but the suites of anomalous elements and the mineralogy of the panned concentrates suggests that the anomalous elements are related to accessory minerals widely disseminated in the bedrock and are not indicative of mineralization. For example, anomalous amounts of lanthanum, zirconium, yttrium, and thorium in samples from drainages west and south of Windy Peak are attributable to zircon, monazite, and thorite, identified with use of the microscope. The tin anomalies in some panned-concentrate samples are likewise probably due to accessory cassiterite.

MINING DISTRICTS AND MINERALIZATION

There are no mining districts in the roadless area. The nearest is the Chewack mining district 6 mi north of the area. This district had numerous claims located for tungsten; the principal tungsten ore mineral was wolframite, which was found here in 1898 by surveyors of the International Boundary Commission. The area was staked in 1908 and developed during 1915 and 1916. In 1936, 30 tons of ore was shipped but proved to be unprofitable (Culver and Broughton, 1945, p. 41).

There are no prospects, claims, or mines in the roadless area. The nearest claim, Lobo No. 1, is reportedly located near Windy Creek outside and just east of the roadless area boundary, but considerable search for this claim revealed no evidence of prospecting, mining, or other development. The commodity for which this claim was located is unknown.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

The geologic and geochemical studies suggest low potential for small metallic mineral deposits within the Long Swamp Roadless Area. The hydrothermally altered and geochemically anomalous area west of the Chewack River (fig. 2, area A) possesses a number of important characteristics of porphyry-type copper-molybdenum deposits. However, other diagnostic features, such as porphyritic host rocks and alteration zonation to potassic or propylitic assemblages, are lacking, and the size of the altered area is small. Thus the resource potential for the deposit is considered low. The occurrence of a molybdenite+quartz vein north of the altered area (fig. 2, area B) also suggests mineral potential, but the host rock is unaltered and no other veins were found; the potential of area B, therefore, is considered low.

Bedrock sources for two geochemically anomalous stream-sediment samples east of the Chewack River have not been identified. The small size of the drainage basin (about 0.7 mi^2) above the anomalous sample in Basin Creek (fig. 2, area D) suggests that mineralization is of very limited extent. The gold- and silver-bearing panned-concentrate sample from Windy Creek (fig. 2, area C) may indicate potential for a placer deposit in that drainage. The source of the precious metals may be quartz veins near the margin of the Cathedral Peak batholith, similar to those of the Oroville-Nighthawk district several miles northeast of Long Swamp Roadless Area (Koschmann and Bergendahl, 1968, p. 260).

There are no mineral, geothermal, or oil and gas leases in the Long Swamp Roadless Area, and the absence of sedimentary or young igneous rocks in the vicinity indicates virtually no potential for such resources.

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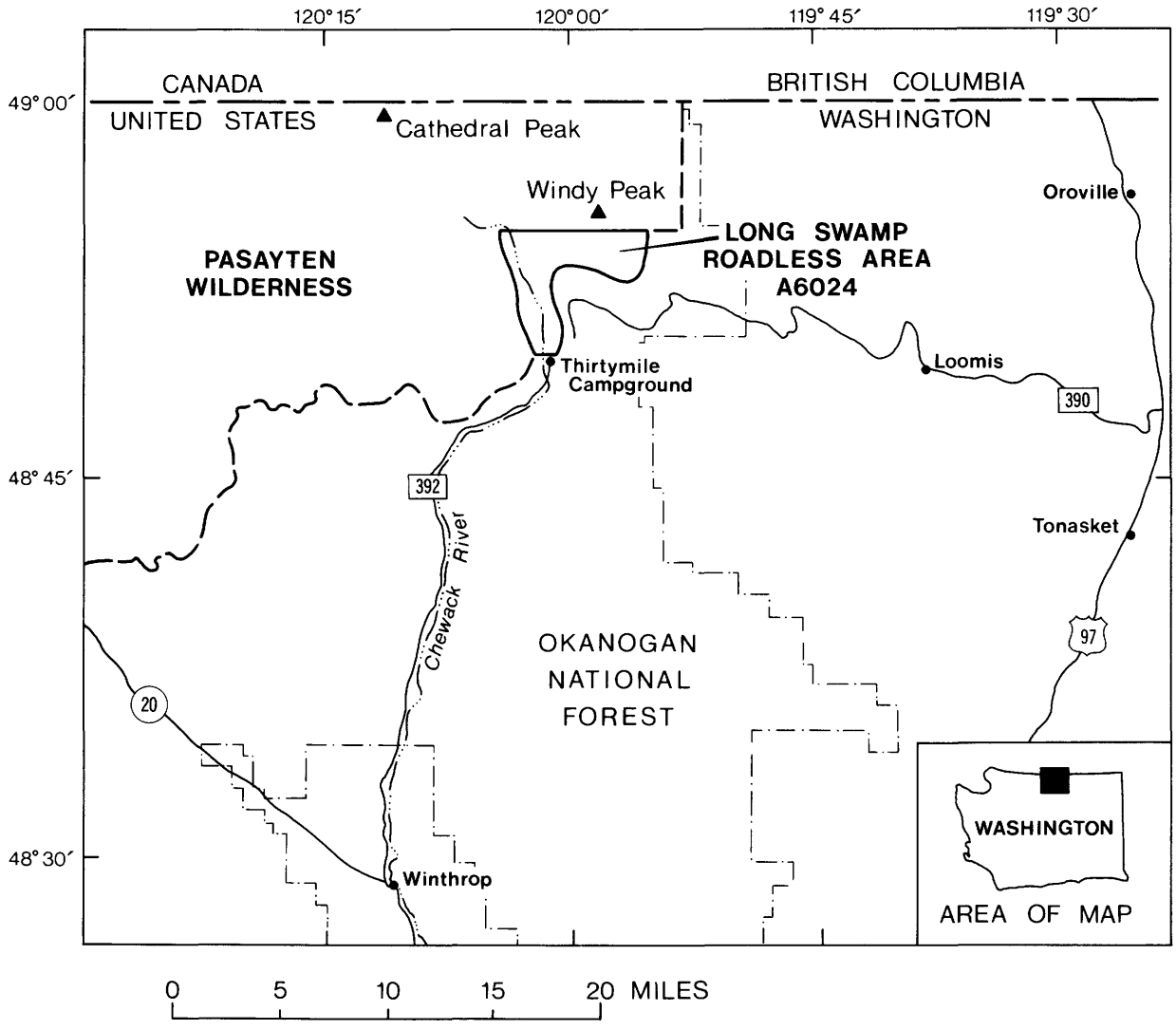

Figure 1.--Location of Long Swamp Roadless Area (A6024) and the Pasayten Wilderness, Okanogan County, northern Washington.

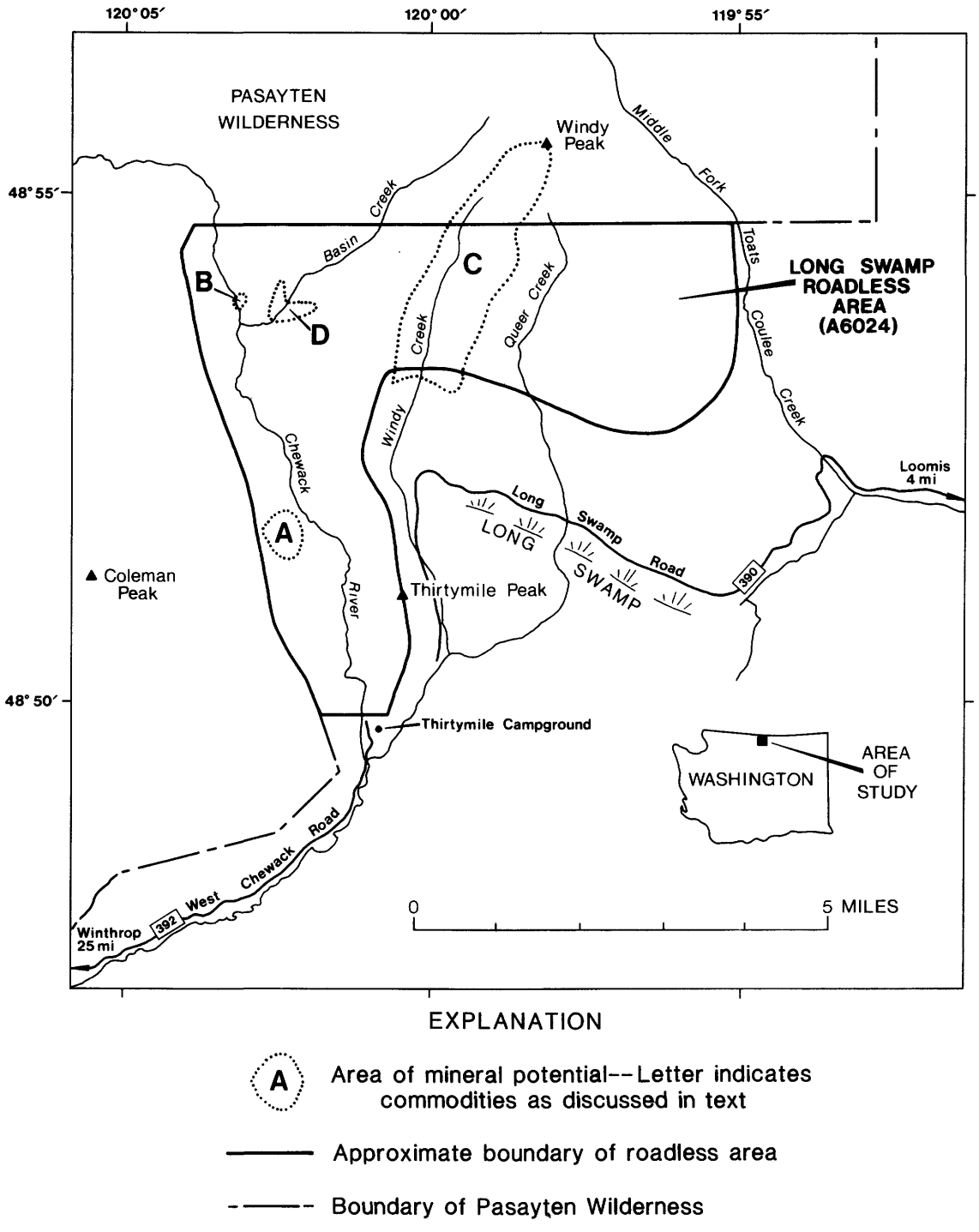

Figure 2.--Mineral resource potential of Long Swamp Roadless Area (A6024).