TUNGSTEN-RICH PORPHYRY MOLYBDENUM OCCURRENCE AT BEAR MOUNTAIN, NORTHEAST ALASKA*

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ABSTRACT

Molybdenum and tungsten porphyry mineralization occurs near Bear Mountain in northeast Alaska within a regional zone of small domes and intrusions. This zone can be traced 80 km to the west and easterly into Canada.

A 50-ha (approximately 100 acres) mineralized area, defined by soil samples containing greater than 300 ppm Mo and 500 ppm W, is underlain by an altered complex of probable rhyolite porphyry dikes. The complex has intruded upper Paleozoic metasedimentary rocks.

Surface exposures of rubble and limited outcrop are extensively leached; molybdenum occurs as molybdite oxides and tungsten occurs in both ferberite and huebnerite end members of the wolframite series. There is an apparent zonation from an upper tungsten-topaz zone capped by massive silica to a lower oxidized molybdenum-rich zone. A lead-rich halo surrounds the complex.

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REGIONALLY METAMORPHOSED, CALC-SILICATE-HOSTED DEPOSITS OF THE BROOKS RANGE, NORTHERN ALASKA*

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ABSTRACT

Three distinctly different calc-silicate-ore suites in the Brooks Range, northern Alaska, show contrasting geologic and metallogenic associations. Both host rocks and plutonic rocks are of Devonian age and all lithologies were subjected to a major Late Jurassic-Early Cretaceous regional metamorphic event.

One calc-silicate suite is associated with peraluminous, high initial $^{87}Sr/^{86}Sr$*, presumably S-type granites and is characterized by anomalous Sn contents, stanniferous grandite and subcalcic garnets with crosscutting amphibole-clinozoisite, and a distinctive boron-rich mineral association. These skarns resemble the Sn-bearing skarns of the Seward Peninsula, except that they have low cassiterite contents and show only limited greisen alteration. The noneconomic nature of the Brooks Range Sn skarns may be related to relatively deep levels of exposure. The second calc-silicate suite is associated with generally metaluminous, presumably I-type, quartz-sericite-pyrite-altered granite and granodiorite stocks and isolated fault slivers. This suite contains high Cu and Ag, variable Pb and Zn, and low Sn; is characterized by andraditic garnet, diopsidic pyroxene, and bornite-chalcopyrite, cut by epidote, actinolite, and pyrite veinlets; and generally resembles a continental margin, porphyry copper-related skarn. The third calc-silicate suite, the so-called "gnurgle gneiss," represents a regionally metamorphosed metalliferous chamical sediment and is not related to igneous-metasomatic processes. This suite is characterized by well-developed mineral foliation, generally low metal contents, lack of sulfide veining and retrograde alteration, and combination of metal ratios and calc-silicate mineral compositions not commonly observed in skarn deposits.*

Although all of the skarns are variably layered (e.g., contain magnetite "ribbon rock") and all the associated igneous rocks are foliated, the metasomatic skarns are distinguished from the metamorphic calc-silicate rocks by the absence of foliation, in addition to the systematic differences in both calc-silicate and ore minerals, compositions, and textures. The metasomatic skarns are virtually unaffected by the regional deformation, presumably due to the highly competent nature of garnet-rich rocks. Metamorphism of the metasomatic skarns is evidenced, however, by the development of moderate temperature, reequilibrated sulfide assemblages, including idaite-chalcopyrite± covellite and digenite-chalcopyrite, and by local semipenetrative cleavages. The characteristics of these metamorphosed skarns and calc-silicate rocks and the fact that they can be distinguished despite the regional metamorphic effects may be used in deciphering other complex metamorphic-metasomatic ore districts.

*Reprinted from *Economic Geology*, vol. 81, p. 1728, 1986. Copyright is held by the Economic Geology Publishing Co.