

NWMA meeting - Spokane - Dec. 6/84

883397
Table mtn

Hydrothermal Alteration And Ni-Au-Hg Mineralization Associated With The Devils Mountain Fault Zone, Skagit County, Washington

By Donald C. Graham
Western Washington University
Bellingham, Washington

The Devils Mountain nickel-gold-mercury occurrence is located in the western foothills of the North Cascades approximately 7 kilometers southeast of Mount Vernon.

Regional basement consists of pre-Tertiary metamorphic, sedimentary, volcanic and ultramafic rocks of the Northwest Cascades Thrust System which is unconformably overlain by unmetamorphosed Tertiary continental sediments.

In the study area the steeply dipping Devils Mountain Fault juxtaposes Eocene Chuckanut arkosic sandstones and conglomerates against pre-Tertiary greenstones, argillites and serpentinites. The nickel-gold-mercury mineralization occurs within a tabular body of silica-carbonate listwanite which lies along the fault and was formed as a result of hydrothermal alteration of serpentinite. The age of the hydrothermal event is not known however Tertiary ash-flow deposits dated at 41.5 ± 3.4 m.a. are apparently offset by the fault. Minerals within the listwanite include quartz, opal, chalcedony, ankerite, magnesite, dolomite and calcite. Sulfide-bearing breccias occur in the western one-third of the listwanite and contain marcasite, pyrite and bravoite ((Fe,Ni)S₂) within the breccia matrix. Chromite occurs in the breccia fragments, the listwanite and in the serpentinite. Native gold has not been observed however it is reported to be disseminated throughout the listwanite and the breccias.

The tonnage and grade of the silica-carbonate listwanite based on exploratory drilling and assays done in the late 1930's have been estimated to be 50,000,000 tons of silica-carbonate rock containing 0.0195 oz/ton Au and 0.25% Ni. Recent analyses of serpentinites, listwanites and sulfide-bearing breccias collected from outcrops and prospects failed to produce Au values greater than 50 ppb (0.0016 oz/ton). Anomalous mercury values up to 10,000 ppb are associated with the breccias. In contrast, serpentinite which has not been hydrothermally altered generally contains less than 300 ppb Hg and less than 2 ppb Au.

The presence of opal, chalcedony and the anomalous Hg indicate that the mineralization occurred in a low-temperature, shallow-depth environment. The listwanites are susceptible to secondary fracturing and may have provided better channel ways for mineral-bearing solutions than the less competent lithologies. Furthermore, the listwanites represent an unusual geochemical environment which may have facilitated the precipitation of Au, Hg and Ni.

The silica-carbonate alteration appears to be similar in mineralogy to altered serpentinites associated with gold-bearing quartz veins in the Altagahney district of California as well as alteration associated with Au-Hg deposits in British Columbia and the Kuznetsk Alatau, U.S.S.R.