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INTRODUCTION

During September 1 to September 29 detailed geologic mapping and sampling was carried out on the Kalum claim, situated on the northeast corner of Kitsumkalum Lake, 35 km north of Terrace. Along the Terrace-Stewart highway are numerous rock exposures as well as along the lake-shore. A stadia survey was conducted along these exposures for mapping at a scale of 1:500, while a grid was cut at 50 m spacings for mapping at a scale of 1:2000 in the forested region east of the highway.

Rock types exposed on the property consist of a package of sandstones, shales, conglomerates and tuffs with interbedded andesitic flows, all deformed and metamorphosed to quartzites, argillites, schists, gneisses and greenstones. The beds generally strike northeasterly to easterly, dip to the north and show a pronounced foliation nearly parallel to bedding.

Mineralization occurs in the form of malachite, chalcopyrite, pyrite and bornite within small quartz veins, as fracture fillings and along foliation planes within a number of the rock units. All significant mineralization was sampled, as well as less significant mineralization, several barren quartz veins and massive epidote (occurring in both the sedimentary and andesite units).

The purpose of this report is to describe in detail the geology, mode of occurrence of mineralization and assay results of the Kalum property.

CLAIM, LOCATION, ACCESSIBILITY

The Kalum claim is a 15 unit block located on the northeast corner of Kitsumkalum Lake, approximately 35 km north of Terrace on the Terrace-Stewart highway (Figures 1 and 2). The property is owned by Mr. Fred Loutitt, consists of 5 units west by 3 units south (of which 2x2 units extend into the lake; see Figure 2), and is within the area of NTS Quadrangle 103I/15W, in the Skeena Mining Division, B.C. The highway (now paved) passes through the center of the claim and is maintained year round, allowing excellent access to the property. Active logging east of the highway has produced a number of dirt roads which permits access to the eastern edge of the property. Elevation of the claim area ranges from lake level (approximately 150 m above sea level) to 600 m above sea level along the eastern boundary of the claim. Slopes are generally steep and outcrops are numerous along the road and lake, becoming sparse further east. Overburden consists of soil and glacial debris ranging in depth from a few centimeters to several meters. The property is forested with both desiduous and coniferous timber.

HISTORY AND PREVIOUS WORK

The Kalum claim occurs in a region that has been of economic interest since 1914, when free gold and copper/ gold showings were found in quartz veins and stringers and surrounding schistose rocks. The property was then known as the Treadwell No. 2 and Juneau claims; it later was staked under the names Maloya and Lake Shore claims in 1931, the Belway and Rex claims in 1937 and finally the Ken and Kalum claims of today. Early development work on the property, around the turn of the century, consisted of a shallow shaft, two short adits and several open cuts. More recently, minor rock and soil sampling around known mineralized occurrences was conducted by Silver Standard Mines, Ltd. (1981) and Weymark Engineering, Ltd. (1981); as a result of road construction in May 1983, a new showing was uncovered on the property and G. Belik and Associates, Ltd. (for Gerle Gold, Ltd.) trenched and sampled it with a bulldozer; geologic mapping, rock sampling and a proton magnetic survey in the vicinity of the showings was also performed by Belik; geochemical soil sampling was carried out by Cominco, Ltd. (1984) on an overburden-covered area immediately east of known mineralization; known showings and new showings recently uncovered by the owners were verified by Dr. Tom Richards (April, 1985); and minor drilling (with a prospector's drill) and rock and soil sampling were conducted by the claim owners in 1985.

REGIONAL GEOLOGY

The Kalum claim is located on the eastern edge of the Coast Range Mountains within sedimentary and volcanic rocks of Jurassic age, classified as Bowser Group by the GSC (Memoir 329). A large granitic batholith, exposed along the highway approximately 1.5 km south of the property (Figure 2), presumably metamorphosed the sedimentary and volcanic rocks during emplacement. Large, normal faults oriented north-south exist in the Kalum valley where the Kitsumkalum Lake is situated (GSC Memoir 329).

LOCAL GEOLOGY

The geology of the Kalum claim consists of a package of sedimentary and tuffaceous rocks with interbedded basic flows of Jurassic age belonging to the Bowser Group. Bedding generally strikes northeasterly to easterly and dips to the north. The rocks have been moderately to strongly deformed and metamorphosed to quartzites, argillites, schists, gneisses and greenstones. A prominent foliation subparallel to bedding is pervasive in the sedimentary rocks and less so in the basic volcanics. Small-scale, tight folding and local recumbent folds can be seen at most outcrops of sedimentary lithology.

Sedimentary rocks predominate along the northern, southern and eastern edges of the property with the interbedded basic flows and tuffs concentrated in the middle-western area (Plates 1 and 2). Basic and acid dykes cut through both sedimentary and volcanic units.

Rock Units

Sedimentary Lithologies:

W goes here → (see next page)

A: Interbedded sandstone and siltstone metamorphosed to quartzites and hornfels. Weathers to an orange-brown color with rusty stains. On fresh surfaces the color is medium to dark gray with a slight purplish hue, and small specks of mica, pyrite and pyrrhotite can be seen. A slight sheen exists on foliation planes. This unit is cut by acid and basic dykes and conformably overlies unit C.

C: Interbedded sandstones, siltstones, shales, conglomerates and possibly volcaniclastics metamorphosed to quartzites, sericite and chlorite schists and hornfels with well developed foliations. The most prominent rock type is a sericite schist with a pronounced silver sheen on cleaved faces. It is locally porphyroblastic with small (2 mm) to large (1.5 cm) andalusite (?) crystals

(TO BE INSERTED AFTER ROCK DESCRIPTION "N")

R: Graphite phyllite - fine grained, shiny dark gray to black phyllite with small conspicuous bumps on cleaved surfaces. Composition of minerals causing the bumps is unknown. Strongly foliated and interbedded with andesite and tuffs

(TO BE INSERTED BEFORE ROCK DESCRIPTION "A")

W: Black argillite - strongly foliated with conspicuous bedding that weathers to a buff color with rusty stains; minute specks of pyrite and pyrrhotite; dense.

that are uniformly medium gray and which produce a knotted texture. Metaconglomerates consist of extremely flattened, silicified pebbles of uniform gray color in a sericite schist matrix. Metasiltstones are light to medium gray or green with a slight sheen on foliation planes and are generally dense and hard. Throughout unit C there has been local epidote replacement along selected beds that have since been deformed, producing isolated pods and folded stringers of epidote ± quartz. The pods are zoned with actinolite concentrated along the boundaries and alternating concentric zones of epidote, quartz and hematite extending to the middle. In places whole beds (up to 2 m thick) of metasiltstone have been replaced producing both massive beds of epidote and thinly bedded zones of alternating epidote and siltstone. Minor garnet was seen in some of the sedimentary beds.

N: Graywacke (?) metamorphosed to a chlorite-rich rock consisting of feldspar porphyroclasts in a chlorite-rich matrix with a strongly developed schistose fabric. Unit N is interbedded with sediments and andesitic flows and tuffs.

R: (see previous page)

Volcanic Lithologies:

F: Intermediate to basic tuffs metamorphosed to chlorite schists and gneisses, characterized by dark green chlorite-rich bands intermixed with gray silica-rich bands, both containing biotite and disseminated euhedral magnetite. In places the unit has a gneissic texture consisting of fine layers (less than 1 mm thick) of epidote, actinolite, quartz(?) + biotite and magnetite. Unit F is interbedded with andesite flows and sediments of unit C.

G: Andesite flows metamorphosed to greenstones. Medium to dark green or gray, very fine grained, basic flow rocks with local vesicles and amygdules (filled with epidote and quartz) and minor pillow structure. The degree of foliation development varies from very slight to strong, defined by flattened amygdules and small flattened clots of chlorite within the groundmass. Unit G is moderately magnetic and is often replaced by epidote in irregular masses to 1 m in diameter. It also contains local concentrations of chlorite/actinolite, specular hematite and magnetite. At several localities a chaotic texture can be seen in the andesite which is presumed to be flow-top brecciation.

Dykes and Sills:

B: Hornblende porphyry dyke consisting of euhedral hornblende phenocrysts (up to 1 cm in length) in a dark green, very fine grained groundmass with trace amounts of pyrite. Unit B cuts unit A.

S: Strongly foliated intermediate dyke consisting of flattened feldspars and aligned hornblende phenocrysts in a medium gray groundmass of similar composition. Very slightly magnetic. Unit S cuts unit A.

K: Moderately foliated intermediate sill/dyke consisting of feldspar phenocrysts and aligned biotite crystals in a medium grayish-green groundmass of similar composition. Moderately magnetic. Unit K cuts both sedimentary and volcanic lithologies.

E: Diorite dyke characterized by medium grained, equigranular hornblende and feldspar, the hornblende locally altered to actinolite. Unit E cuts unit C.

Quartz veins:

Quartz veins occur in all rock types and range in width from a few millimeters to 2 m. They follow foliation planes as well as cross-cut metamorphic fabrics as fracture fillings and in association with shear zones. Chlorite, epidote, hematite and magnetite occur locally within quartz veins.

Structure

The overall structure of the Kalum property consists of gently to steeply dipping sedimentary beds and basic flows that have been moderately deformed. The beds generally strike northeasterly and dip northwesterly from 10 to 55°. A strong, penetrative foliation exists nearly parallel to bedding and is easily seen at most outcrops. Foliation attitudes range from 8 to 177° and dip from 10 to 55° northwesterly to easterly with the most prominent attitude being about 55° strike and 35° NW dip. Movement along foliation planes is evident by offset of quartz veins. Minor warps can be seen on outcrop faces in three dimensions, with tight folding visible on northwest- and southeast-facing fracture surfaces. Many quartz veins and epidote seams are isoclinally folded in the less competent schistose units, and only slightly disturbed in the more competent quartzite and andesite units. Attitudes of fold noses consistently plunge gently to the northeast. Several small-scale, tight, recumbent folds (open to the south) are visible in metasiltstone outcrops on westerly facing fracture surfaces, and local changes in foliation attitudes point to the existence of larger folds. An axial-plane cleavage is visible at some localities and at one small outcrop a foliation parallel to the fold and cut by the axial-plane cleavage was seen, indicating at least two major episodes of deformation occurred. It is the author's opinion that the prominent foliation subparallel to bedding was developed prior to emplacement of the granite batholith occurring south of the property, but that the gentle warping and tight recumbent folds developed as a result of the emplacement of the batholith.

Several faults are evident on the property. Two faults occur in the quartzite unit (unit A) at the north end of the property along the road cuts. They are high-angle and seem to parallel bedding: beds on either side of the faults are parallel but have been dragged upwards to be steeply dipping to the northwest. Minor fault gouge and slickensides can be seen between the two sedimentary units on either side of the faults. Another fault may exist on grid line 2+50 E around station 12+00 N between unit C to the north and unit A to the south. Foliation attitudes are discordant across the poorly exposed contact, and the sequence is opposite to what was observed along the highway. Two other faults exist between metasediments and andesite, visible along the lake shore. Foliations in the sediments are sharply discordant with foliations in andesite suggesting dragging along the fault, and boulders of massive magnetite are found in this region, possibly coming from the fault zone. Degree and direction of displacement along all these faults is very difficult to ascertain.

A few local shear zones are present on the property, two worthy of note. One exists at the southern adit and is characterized by a strong warp in the contact between graphite schist and andesite, accompanied by a crumbly texture to the outcrop and a white/yellow powdery film coating the rocks. The andesite has a pronounced rod and mullion structure developed in this vicinity and there is an abundance of quartz veins, mainly paralleling foliation planes.(*) The other shear zone occurs along the highway just northeast of the south-adit shear. Here exists a zone of highly friable rock approximately 18 m in width, that crumbles easily and appears to be composed of a chlorite-sericite schist with actinolite needles on foliation planes. Attitude of the shear zone could not be adequately determined but may trend in a north-

(*) An outcrop in andesite with a similar appearance occurs on grid line 0+60 E near station 9+00 N.

easterly direction. In addition to these two major shears several smaller shears exist characterized by slightly friable rocks and quartz veining.

Numerous joint surfaces occur at all outcrops with three directions being most prominent: southeast strike with nearly vertical dip to the west, north strike with moderate dips to the west, and southeast strike with shallow dips either to the northeast or southwest. The latter are commonly filled with quartz whereas the others are usually filled with epidote ± quartz.

It is the opinion of the author that the joint surfaces are a much younger feature than the folding and foliation development. The jointing is possibly related to regional east-west extension presumably responsible for formation of the Kitsumkalum valley. Major north-south joint faces occur on many of the outcrops along the highway as well as outcrops in the forested region to the east. A terraced effect exists between outcrops here, with outcrops to the west "stepped down" from outcrops to the east suggesting faulting along normal faults oriented north-south.