

Petrology of the Syenite Complex

The Galore Creek syenite complex is made up of a series of syenite (orthoclase porphyry) intrusions, four phases of which are considered to be major rock types associated with copper deposits. In addition, at least six more phases are recognized, most of which are peripheral to the Central Zone deposits. Bedded rocks near syenite intrusions are extensively metasomatized, recrystallized and locally brecciated.

METAVOLCANIC ROCKS

The copper-bearing rocks in and around the Galore Creek deposits consist of moderately to intensely altered volcanic rocks. They include pyroclastic and intrusive breccias, trachyte flows, lithic tuff, crystal tuff and pyroxene andesite. These rocks have been converted to skarns and fenitic porphyroids, so that the identity of the original rocks is often uncertain (Fig. 5-E, F, G). During much of the early history of exploration, volcanic rocks were systematically catalogued on the basis of three major components, orthoclase, biotite and garnet, and referred to as "hornfels" (e.g., biotite-orthoclase hornfels).

In the southern Central Zone, copper minerals occur in altered volcanic breccia and crystal tuff. These rocks contain varying amounts of lithic fragments, up to 5 cm in diameter, and subhedral to euhedral crystal fragments of K-feldspar up to 1 cm in length. K-feldspar crystals are present in the lithic fragments and the enclosing matrix. Unmineralized volcanic breccias and crystal tuffs are found northeast of the Central Zone.

Pseudoleucite phonolite is a common host rock in the northern Central Zone. The rock contains rounded to euhedral phenocrysts of pseudoleucite up to 2.5 cm in diameter. The phenocrysts are commonly altered to fine-grained K-feldspar and, in places, are composed entirely of sericite. Rarely, they are rimmed by biotite and magnetite or have a core of epidote. The groundmass consists mainly of fine-grained K-feldspar with or without "clots" of biotite, garnet, epidote and sulphide minerals (Fig. 5-F). Local thin beds or sills of pseudoleucite phonolite occur in a sequence of volcanic rocks west of the Galore Creek complex. Pseudoleucite is also found in one of the intrusive rocks of the complex (dark syenite porphyry described below), indicating a genetic relationship of intrusive and host volcanic rocks.

Massive and porphyritic potash feldspar rich rocks in the Central Zone may be trachyte flows or sub-volcanic dykes. Trachyte porphyry (Junction syenite porphyry of Barr, 1966) is the most common host rock of the Junction and North Junction deposits. It is characterized by small platy phenocrysts of K-feldspar generally less than 1 cm in length (comprising 0 to 60 per cent of the rock) and a dark grey fine-grained groundmass. The rock has a well-developed trachytic texture.

Thin-bedded or laminated tuff occurs in the middle and northern part of the Central Zone. The tuffs are interlayered with phonolite, trachyte and volcanic breccia. In the east part of the Central Zone, strata trend east and dip south; in the southern Central Zone, the bedding strikes east to northeast and dips moderately to the southeast. Slump structures, which have amplitudes of about 10 feet, are exposed in the adit in the middle part of the Central Zone deposit. Tuffs are generally white, pinkish grey or grey and consist of fine-grained K-feldspar, with varying

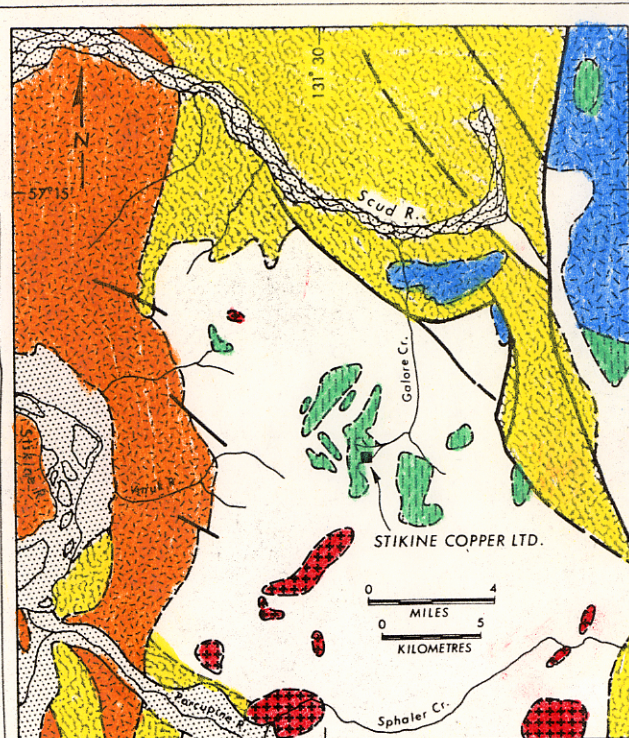


Figure 1 GENERALIZED GEOLOGY
OF THE
GALORE CREEK MAP AREA
104 G 3W/4E

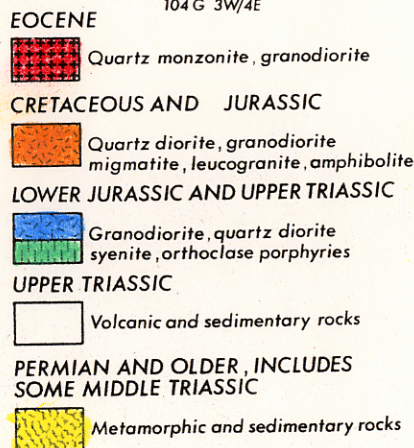


FIGURE 1—Geology of the Galore Creek area.

amounts of biotite, garnet and sulphides as segregations defining bedding and as disseminated masses.

Pyroxene basalt occurs locally in the northern part of the Central Zone. Weakly altered rock consists of subhedral to euhedral dark green pyroxene averaging 0.5 cm in diameter and a dark green fine-grained chloritic groundmass. Where the rock is mineralized and altered, pyroxene has been replaced by pseudomorphic fine-grained biotite that imparts a characteristic spotted texture. Groundmass generally consists of K-feldspar, fine-grained biotite and garnet. The basalt forms a marker bed about 6 to 12 meters thick and is readily correlated between drill holes in the northern part of the Central Zone.

DARK SYENITE PORPHYRY

The oldest intrusive rocks at Galore Creek are dark syenite porphyries. In the southern Central Zone, the rocks form a plug-like body. Elsewhere, dark syenite porphyries form an irregular east-dipping dyke in the