GEOLOGY OF NORTHWEST HALF OF IRON MASK BATHOLITH

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REGIONAL SETTING

The Iron Mask batholith was emplaced in a high level volcanic to subvolcanic environment and is comagmatic and coeval with Nicola volcanic and minor sedimentary rocks which it cannibalizes and intrudes. The Nicola rocks and Iron Mask batholith are unconformably overlain by Tertiary volcanic and sedimentary rocks of the Kamloops Group. Major systems of northwesterly, northerly, and northeasterly trending recurring fractures or faults controlled emplacement of the various units of the Iron Mask batholith. Post-batholith movement on faults around the margin of the batholith results in graben structures with off-batholith rocks on the down-thrown side.

GEOLOGY

The descriptions of the rocks shown on Figure 5 are based on field observations of texture, composition, and kind and intensity of alteration. Laboratory studies of the rocks will be carried out so descriptions given here are subject to revision.

NICOLA ROCKS

Nicola Group rocks in the vicinity of the northwest end of the Iron Mask batholith consist largely of pyroclastic rocks with some interbedded flows. Minor amounts of interbedded Nicola sediments and sedimentary blocks in breccia were observed northwest of Sugarloaf Hill (fossiliferous) and north of Hughes Lake. Ammonite fossils found northwest of Sugarloaf Hill are tentatively thought to be Upper Triassic (Tipper, H. W., personal communication). Tuff breccias and lahars with interbedded flows are probably of andesitic to basaltic composition.

The Nicola lahars and tuff breccias contain fragments of the same kind of Cherry Creek rocks that intrude them. In some places the fragment density is so great (>90 per cent) that it is difficult to distinguish these fragmental rocks from intrusion or explosion breccias occurring within the batholith. The Nicola rocks are chloritized, epidotized, and mineralized by copper and iron as a result of intrusion of the Iron Mask batholith, particularly at the northwest end of the batholith. The intensity of metamorphism and mineralization decreases markedly a short distance from the batholith contact. The presence of fragments of intrusive rocks with volcanic rocks cut by identical intrusive material, and the contact effects of the batholith on these volcanic rocks demonstrate the close spatial and time relationship between Nicola volcanism, emplacement of young varieties of intrusive rocks, alteration, and mineralization.

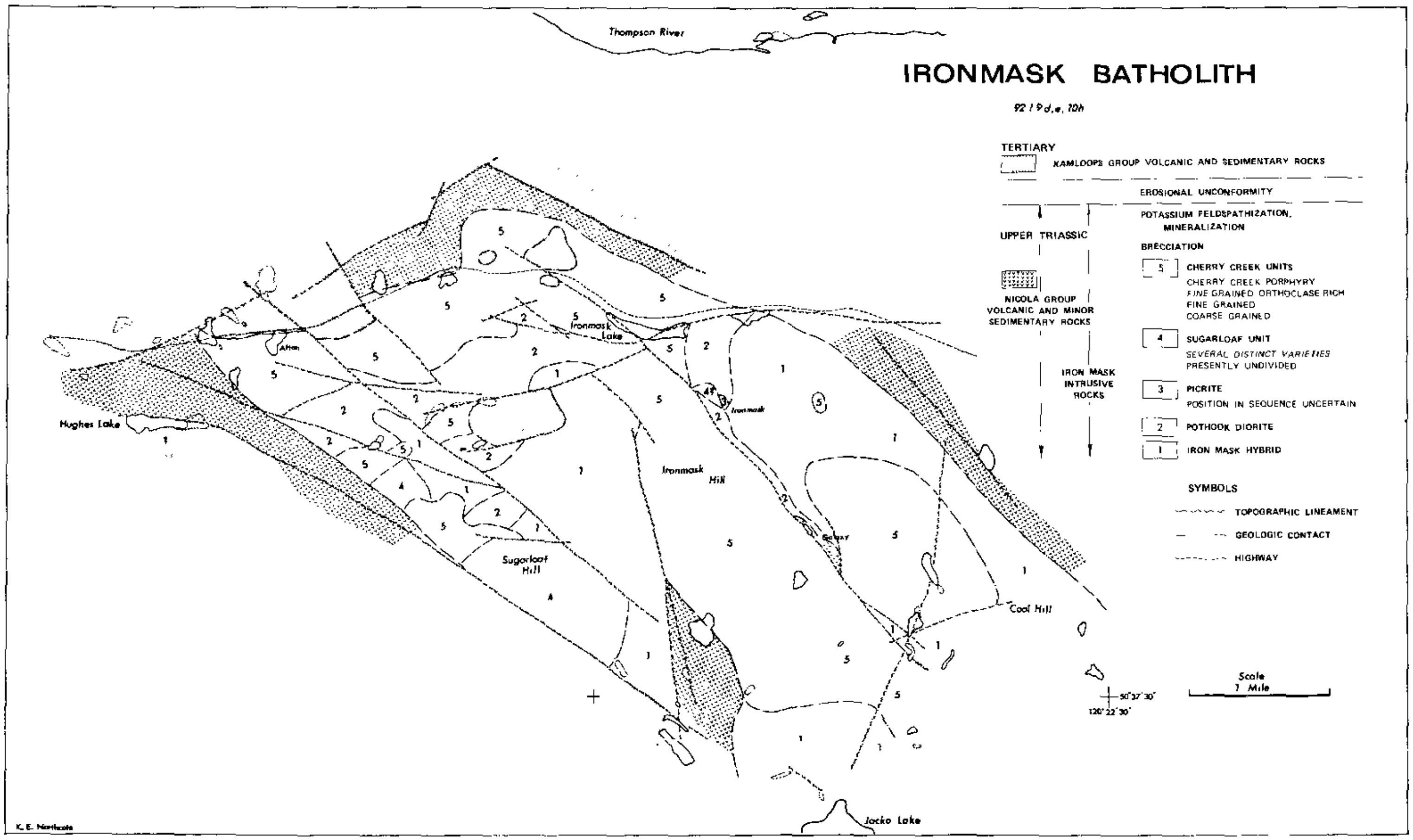

Figure 5. Generalized geology, northwest half of Iron Mask batholith.

INTRUSIVE ROCKS OF THE IRON MASK BATHOLITH

All intrusive units, with the possible exception of 'picrite,' are believed to be genetically related. They all show some degree of saussuritization which in many places is intense. However, in most cases original textures are still visible and are used as the main criteria for distinguishing among units and varieties.

IRON MASK AND POTHOOK UNITS

The Iron Mask (1) and Pothook (2) units are high level intrusions emplaced along northwesterly, northerly, and easterly trending zones of weakness.

The Iron Mask unit is agmatitic, containing varied sizes of rounded and angular fragments of coarse and fine-grained diorite, coarse-grained gabbro, medium and coarse-grained hornblendite, and scattered xenoliths of Nicola rocks in a diorite matrix. The origin of the intrusive fragments in agmatite is unresolved but these may represent slightly older intrusive equivalents of Lower Nicola volcanic rock carried up to a higher level by resurgence of magmatic activity. These rocks are intruded by younger units. The dominant structural control for emplacement of the Iron Mask rocks is a system of northwesterly trending recurrent faults. Copper and iron mineralization is associated with this intrusive stage.

The Pothook unit is of dioritic composition and is medium to coarse grained. The low degree of differentiation of these rocks indicates that they are most closely related to unit 1 rocks and their distribution suggests strong control of emplacement by northwesterly and northeasterly trending fracture systems. Although this unit is abundantly mineralized by magnetite, it also contains numerous copper showings.

PICRITE

The picrite unit (3) is composed of rocks of basaltic composition, with serpentinized olivine, reported by Carr (1956) and Preto (1967). Emplacement of picrite appears to closely follow loci of recurring, northwesterly trending fracture systems and is found in many parts of the batholith (Carr, 1956). The unit is cut by clean fine-grained rocks akin to the Cherry Creek unit.

SUGARLOAF UNIT

Sugarloaf (4) porphyritic rocks crop out on Sugarloaf Hill and as a smaller body containing fine-grained non-porphyritic varieties northwest of Sugarloaf Hill. The rocks are mainly porphyritic with hornblende, pyroxene, and plagioclase phenocrysts and are of fairly uniform diorite-andesite composition. Strong recurring northwesterly trending fracture systems presently flanking Sugarloaf Hill probably localized emplacement of this unit. Copper mineralization occurs in cross-fracture systems within this unit.

CHERRY CREEK UNIT

The name 'Cherry Creek' (5) is retained for the unit of rocks which extend along the north margin of the batholith (Preto, 1967), and is applied to equivalent rocks underlying Iron Mask Hill and an area east of Galaxy.

The Cherry Creek unit was emplaced in a high level volcanic to subvolcanic environment, from localized magma sources of different degrees of differentiation, into a widely varied physical and chemical environment. The resulting textures of the related intrusive varieties varied according to chemical and physical changes including retention or loss of volatiles. It was possible, therefore, to obtain textural varieties such as Cherry Creek porphyry at any time during emplacement of the Cherry Creek unit. Varieties of Cherry Creek rocks have a characteristic texture which is recognizable through differences in grain size and composition. Compositional differences are mainly the result of varied amounts of K-feldspar present. Composition ranges through diorite, monzonite, syenite, and their porphyritic and fine-grained equivalents.

AFTON – IRON MASK LAKE BRECCIA

One of the latest magmatic events to occur along the Afton – Iron Mask Lake belt of Cherry Creek intrusions was intrusive or explosive brecciation accompanied by potassium feldspathization and copper and iron mineralization. The economic significance of this breccia was noted by Preto (1967).

STRUCTURE

Major systems of northwesterly and northerly trending recurring faults occur on the southwest and northeast flanks of the batholith in intrusive and in Nicola rocks. Similar systems also occur within the batholith on the northeast side of Sugarloaf Hill and on the west and northwest side of Iron Mask Hill. These northwesterly and northerly trending faults played an important role in the emplacement of old and intermediate age intrusive rocks. Important systems of easterly and northeasterly trending faults localized emplacement of varieties of the younger Cherry Creek unit, subsequent brecciation, potassium feldspathization, and mineralization. Late movement along fault systems flanking the Iron Mask batholith has resulted in downward movement of Nicola and overlying Kamloops Group rocks relative to the batholith.

MINERALIZATION

J. M. Carr (1956, pp. 47-69) and V. A. Preto (1967, pp. 137-147; 1972, pp. 209-220) have given detailed descriptions of mining properties and mineralization.

REFERENCES

Carr, J. M. (1956): Deposits Associated with the Eastern Part of the Iron Mask Batholith near Kamloops, *Minister of Mines, B.C.,* Ann. Rept., 1956, pp. 47-69.

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