GEOCHEMICAL SAMPLING, GEOLOGY, AND MAGNETICS OF THE KAKETSA STOCK

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INTRODUCTION

As part of a geochemical study of Triassic Cordilleran plutons being conducted in cooperation with the B.R.G.M. of France, several composite intrusions containing ore deposits in southern British Columbia have been sampled. The samples will be analysed and tested by statistical techniques developed by the B.R.G.M. For comparative purposes, it was decided to sample a stock of similar age and tectonic setting that was petrologically simple but contained no known ore deposits. The Kaketsa stock was chosen because it has been dated at 218±8 m.y., cuts Triassic volcanic and associated sedimentary rocks, and although there are mineral showings in volcanic rocks adjacent to the stock, it contains no *known* deposits of significant size (GEM, 1972, pp. 547-549). The ultimate purpose of these studies is to attempt to discover geochemical criteria which will distinguish productive from barren plutons.

SAMPLING PROCEDURE

A grid with 1-kilometre squares was overlain on a 20-chain topographic map covering the area of the stock. An attempt was then made to collect at least one sample from each grid square. Each of the 50 samples collected consists of several fist-sized specimens with a composite weight of 2 to 3 kilograms. All samples will be analysed for trace elements, selected samples will be subjected to major element analysis, and biotite from one sample will be separated for a K-Ar age determination to test the existing date which is based on hornblende.

GENERAL GEOLOGY

An attempt was made to map petrological variations within the stock. Because time available was limited, reconnaissance mapping was conducted along traverse lines and only areas around sample stations were examined carefully. Hence, map figures in the report are based almost entirely on data from 50 sample sites.

The stock consists mainly of fine to medium-grained diorite. Based on visual estimates, quartz content is approximately 10 per cent. Locally, the rock is monzonite or quartz monzonite. Local pods of amphibolite and mafic diorite occur and are attributable to contamination by the basic volcanic country rock. Volcanic rock adjacent to the stock is recrystallized and cut by dyke stockworks and dyke swarms.

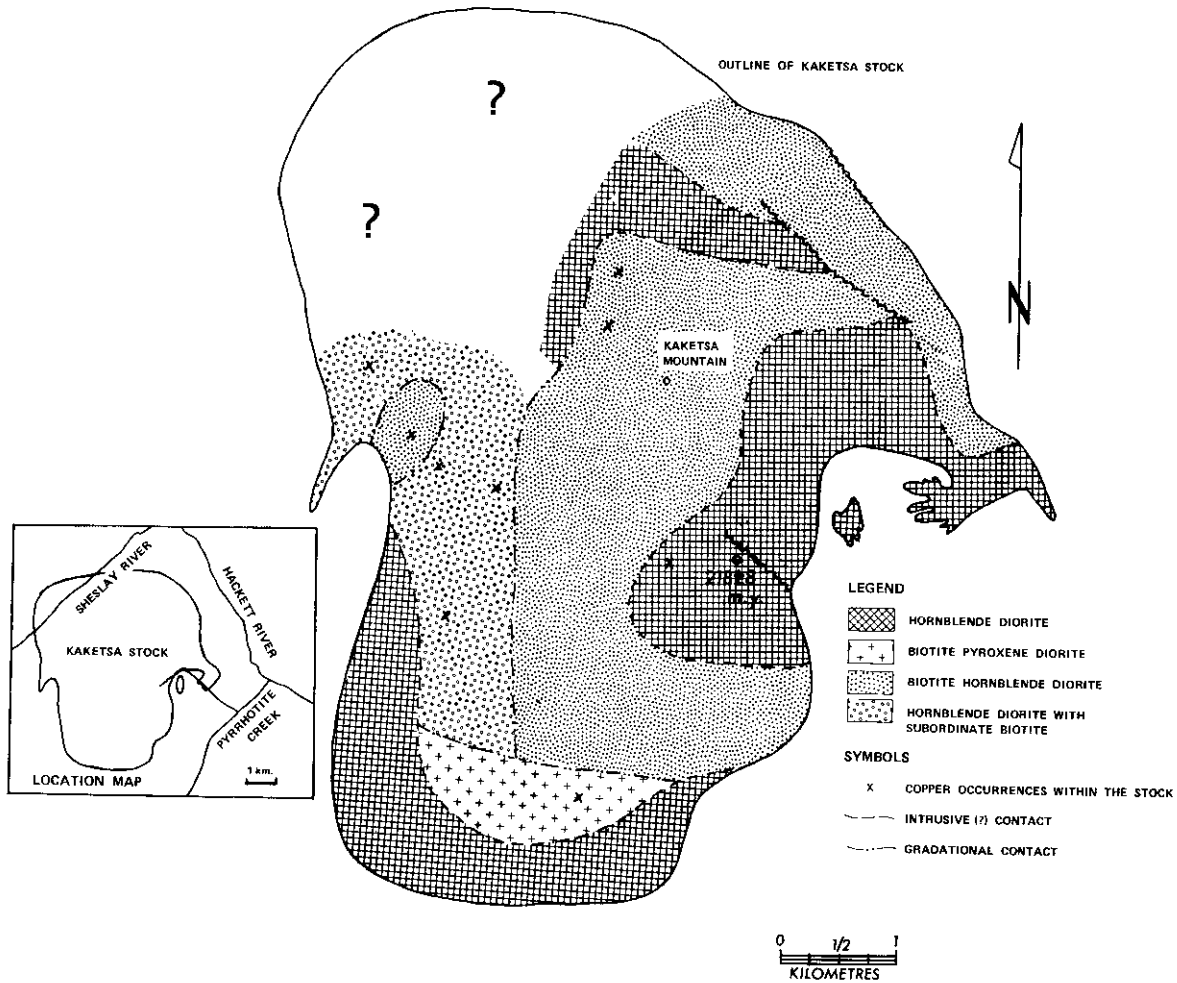


Figure 17. Location and geology, Kaketsa stock.

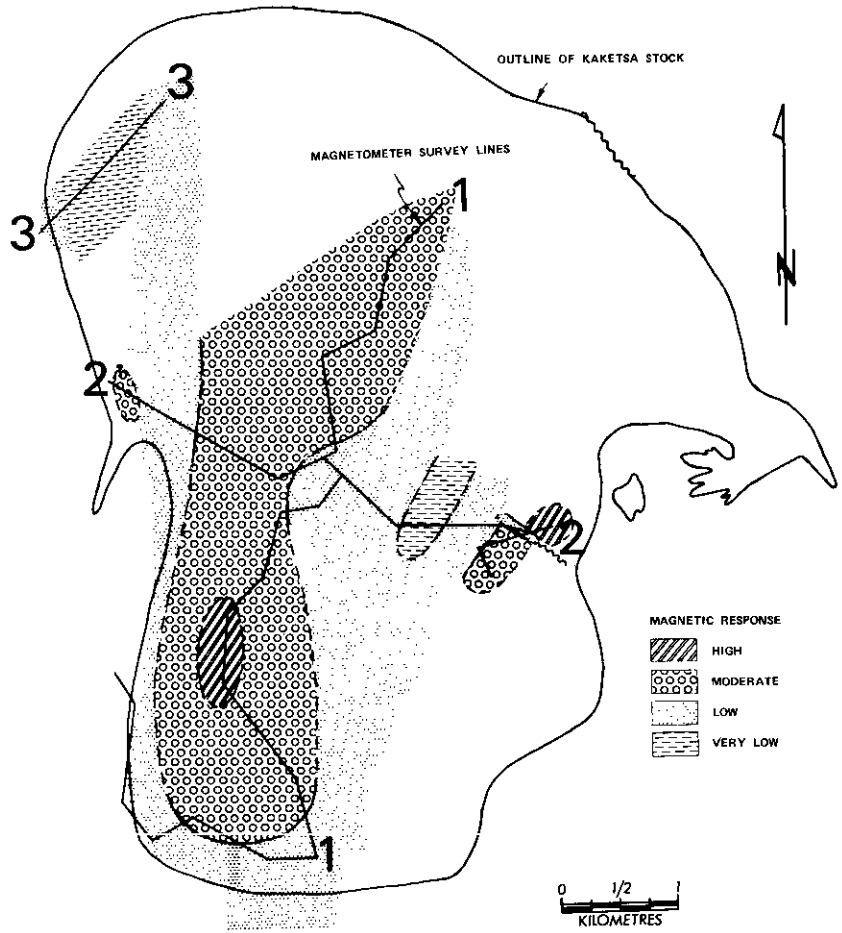


Figure 18. Magnetometer survey, Kaketsa stock.

Mapping suggests that the stock can be subdivided into 'phases' and 'varieties' based on the types and relative proportions of mafic minerals present (Fig. 17). Four divisions can be made: hornblende diorite, biotite hornblende diorite, biotite pyroxene diorite, and hornblende diorite with subordinate biotite. In the biotite hornblende diorite, hornblende to biotite ratios vary from 3 to 1 to less than 1 to 1. In the diorite with subordinate biotite, these ratios are typically 10 to 1 or more.

The stock has a discontinuous border zone of hornblende diorite. The biotite-bearing rocks are internal to and perhaps intrude this border 'phase.' The biotite-bearing 'phase' of the stock consists of two main 'varieties' which separate the stock into east and west halves. Hornblende is the predominant mafic mineral in the west half whereas biotite is a major constituent of rocks in the east half. Biotite pyroxene diorite occurs near the south edge of the stock. No intrusive relationships were noted between the biotite-bearing varieties and they appear to have intergradational contacts. However, the higher content of hydrous minerals in the biotite hornblende diorites suggests that they may have crystallized later than the less hydrous hornblende-dominated diorites. The relationship of the biotite pyroxene diorite variety to the other rocks is uncertain.

In biotite-bearing rocks, biotite often occurs along planar zones. Furthermore, biotite is locally coarse grained and poikilitic. It is possible that the biotite either separated into layers by magmatic flow differentiation or grew during a later hydrothermal event.

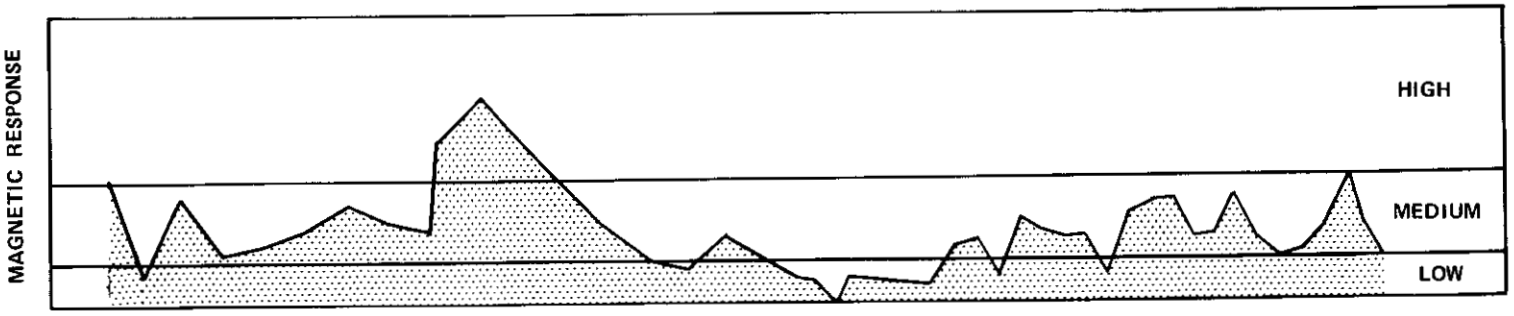
ALTERATION, VEINING, AND MINERALIZATION

Mineralization, associated alteration, and veining in the country rock east of the stock were briefly described by Panteleyev (GEM, 1972, pp. 547-549). No significant mineral showings were encountered during the sampling project, but several copper occurrences (Fig. 17) were found. Weak to moderate propylitic alteration of the granitic rocks is common. It is often accompanied by potassic alteration along fractures and quartz or epidote veining and fracture coating. Chlorite and carbonate also coat fractures locally. Chalcopyrite was the only primary copper mineral found. It normally occurs in association with epidote or quartz in veins. In one instance, chalcopyrite formed a veinlet in a potassic alteration zone and rarely, minute grains of chalcopyrite are disseminated in the diorite. Pink zeolite (laumontite) coats fractures in many areas of the stock.

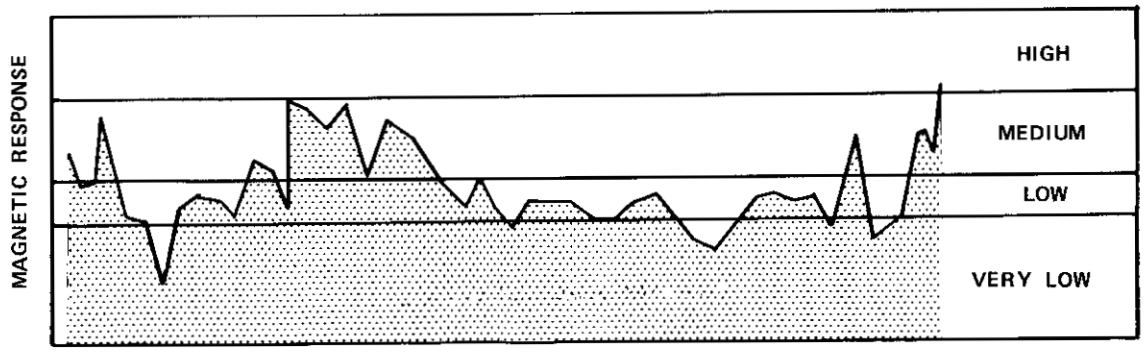
GROUND MAGNETOMETER SURVEY

In conjunction with the sampling programme, an attempt was made to obtain magnetic profiles across the long and short dimensions of the stock using a hand held Arvella Everyman magnetometer. Locations of the magnetometer survey lines are shown on the contoured magnetic map (Fig. 18).

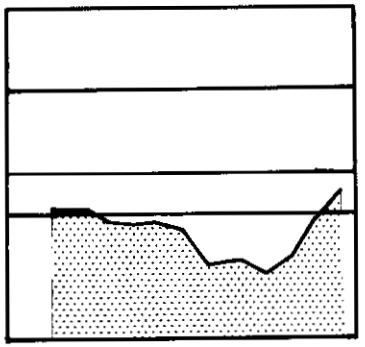
Although the profiles are not complete, there are a series of magnetic lows near the contacts of the stock which are accompanied by higher readings closer to or outside the contact (Fig. 19). It is inferred that these paired highs and lows are caused by the borders of the stock acting as a dipole. From this, we infer that the stock is shallow.



PROFILE 1 – 1: NORTH–SOUTH MAGNETIC PROFILE (LOOKING WEST)



PROFILE 2 – 2: EAST–WEST MAGNETIC PROFILE
(LOOKING NORTH)



PROFILE 3 – 3: NORTHEAST–
SOUTHWEST MAGNETIC PROFILE
(LOOKING NORTHWEST)

Figure 19. Magnetic profiles across the Kaketsa stock (*see* Figure 18 for location of profiles).

The map interpretation of the magnetic data shows a general magnetic high zone over the western half of the stock. The high is more or less coincident with the hornblende-dominated variety of the biotite-bearing diorite phase. Perhaps these rocks are somewhat richer in magnetite than the more hydrous biotite hornblende diorite to the east.

In one area, southeast of Kaketsa Mountain, a linear magnetic low coincides with a gully which is inferred to be a fault. Presumably, magnetite in the fault gouge was destroyed by oxidation.