GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES

Geological map of the southern margin of the Richmond Gulf Graben, Lac Guillaume-Delisle, New Québec

Scale 1:50,000 Échelle

Geology by F.W. Chandler,[1] André Ciesielski[1] and Robert St.Michel, 1981

[1] Geological Survey of Canada

Base map assembled from parts of 33N/15, 33N/16, 34C/1, and 34C/2

LEGEND

APHEBIAN
NASTAPOKA GROUP

7	Basalt, 25-40 m
6	Quartz arenite overlying stromatolitic carbonate, 170 m

Angular unconformity

RICHMOND GULF GROUP

5	5a, mafic sill, 25 m cutting 2, and 5b mafic dykes cutting 1 and 2
4	QINGAALUK FORMATION, 200 m+ 4a, Basal volcanic conglomerate overlain by interbedded red fine-grained arkose and red mudcracked laminated sandstone/mudstone; overlain by 4b, pink arkose and arkosic grit. 4c, local terrestrial basalt within 4b
3	PERSILLON FORMATION, basalt, 0-40 m+
2	PACHI FORMATION, mainly pink arkose, 250 m+

Nonconformity

ARCHEAN

1	Granitic rocks, pink, homogeneous, foliated or massive

Outcrop, area of outcrop
Geological boundary; defined, approximate, assumed
Limit of mapping
Bedding; horizontal, inclined
Syncline; with plunge
Fault; down throw marked, defined, approximate, assumed
Lead-Zinc deposit; location approximate — Pb-Zn

DESCRIPTION OF GEOLOGY

This file essentially completes the geological map of the Richmond Gulf Graben started with Geological Survey of Canada, open file 600 (Chandler 1979). The map covers the southern border zone of the graben which is marked by a set of broadly east-striking, often listric normal faults, downthrown to the north. On the upthrown side of the faults the granitic basement (1) is, in many places, raised as rounded cliffs one to two hundred metres high. On the downthrown side of the faults the sedimentary, volcanic and included mafic intrusive rocks of the Richmond Gulf Group (2-5) dip towards the faults except where upturned to form synclines by drag at the fault surfaces. In the northern part of the map area many similar faults transect the Richmond Gulf Group, but the overlying Nastapoka Group is virtually unfaulted. Regionally the Richmond Gulf and Nastapoka Groups dip gently more or less westward and the Nastapoka Group overlies the more steeply dipping Richmond Gulf Group with gently angular unconformity. Where the lower group has been removed by erosion on the south margin of the graben the upper group lies directly on the granite basement. The above information, as well as absence of paleocurrent and facies changes in the Richmond Gulf Group attributable to the faulting, places graben formation between deposition of the two groups.

Although abundant faulting and insufficient outcrop of the Richmond Gulf Group prevent detailed interpretation of its structure, the low lying eastern part of the map area is seen to be underlain by the Pachi Formation (2) and the included mafic sill (5a). Higher ground to the west exposes the stratigraphically overlying volcanic Persillon Formation (3) and redbeds of the Qingaaluk Formation (4a). Further west, pink arkose of Qingaaluk formation (4b) is preserved in the lower parts of steep cliffs capped by the Nastapoka Group (6, 7). A similar succession is present in the southwest near the mouth of the Little Whale River. Metamorphism, apart from limited contact effects of the volcanics and sills, are not visible in the field.

The basement of the area consists almost entirely of relatively homogeneous granodiorite (1) with varied intensity of deformation and foliation striking at about 290°. Scattered metre-sized mafic and ultramafic inclusions could be fragments of pre-Kenoran dykes. The contact with the nonconformably overlying Richmond Gulf Group (2-5) is, in many places, faulted. Where it is undisturbed there is green and white alteration of feldspars and no sign of an oxidised weathering zone. Hematite stain in some shears in the granite may be connected with local diagenetic oxidation of the overlying sandstone (2). In the extreme southwest of the area, where the granite is overlain by carbonates of the Nastapoka Group, it is locally pyritised by reducing sulphurous fluids descending from the carbonates.

The Pachi Formation (2), overlying the basement granite in the graben, consists of crossbedded arkose, usually pink but with minor amounts white and red. Grain size varies from fine sand to pebbly grit. A red sandstone with 5 cm quartz pebbles occurs locally at the base. Small amounts of red and light green mudcracked mudstone are present at all levels in the formation.

The Persillon Formation (3), a sequence of terrestrial basalt flows, overlies the Pachi Formation with sharp contact. No fragments of the lower unit were seen in the basalt. The basalt is very rarely absent, and where it is red sandstone (unit 4a) containing basalt pebbles directly overlies unit 2 with no apparent sedimentary hiatus. At the base of the basalt there are pipe vesicles, and within it columnar jointing with reddened margins, a feature not obvious where the basalt forms cliffs. Pea-sized vesicles and amygdules, some green, others of jasper, white quartz and agate are also present. The top of the unit has been reddened by weathering.

The Qingaaluk Formation (4) commences with one to several metres of cobble-boulder conglomerate (4a) derived from the conformably underlying basalt. The sandy to muddy matrix of the conglomerate is red, and locally boulders show advanced spheroidal weathering. The conglomerate is overlain by the remainder of unit 4a, a fine- to medium grained crossbedded arkose interlaminated with mudcracked red mudstone and siltstone, the colour being derived from the underlying basalt. This unit is 80 m thick to the north (Chandler 1979). The bulk of the Qingaaluk Formation consists of crossbedded pink arkose and pebbly grit. Pebbles, usually 2-3 cm across are of granite and quartz. Beneath unit 6 the arkose is bleached, rusty-weathering and sporadically pyritic. A local volcanic unit (4c) similar to unit 3 in appearance occurs in the coastal cuesta high in unit 4b. It is lenticular in vertical section, up to 21 m thick and was traced 5 km along strike.

A diabase sill (5a) at least 25 m thick occurs, except in the extreme southwest of the graben, within unit 2. Its stratigraphic position varies from within two metres of the basement to a hundred metres up into the formation. It can be separated in the field at a distance from unit 3 by the well developed columnar jointing that it displays in cliffs. Though smaller satellitic sills were noted to the north of the mapped area none were seen in the map area. Mafic dykes are extremely sparse in the area. One 15 cm dyke, striking southwest cuts unit 2 and is on strike with one observed 6.5 km to the northeast that cuts the basement.

Unit 6, present in the east-facing cliffs of the coastal cuesta is composed of about 150 m of peritidal stromatolitic carbonate overlain by 20-25 m of marine quartz arenite. In a several metre-thick rusty zone 2/3 of the way up the carbonate lie the Ruby Lake and Nancy Island deposits (see map) containing 525,000 and 96,000 tonnes respectively of 2% combined lead-zinc (Franklin and Thorpe in press).

The cuesta is capped by a basalt unit (7) that continues westward to the coast. At least four flows 10 to 20 m thick occur. Rare interflow layers 1-2 m thick consist of breccia and fine-grained sediment. The flows are relatively homogeneous and columnar jointing is very common. Flow tops are brecciated and near them red banded agates and vesicles are concentrated. Zones several metres thick contain plagioclase crystals up to 10 cm in size. Pillows are rare.

References

Chandler, F.W.

1979: Geology of the Aphebian supracrustal rocks, Lac Guillaume-Delisle, Quebec; Geological Survey of Canada, Open File 600, two bedrock geological maps, scale 1:50 000.

Franklin, J.M. and Thorpe, R.I.

In Press: Comparative metallegeny of the Superior, Slave and Churchill Provinces, in Precambrian Ore Deposits, Geological Association of Canada, Special Volume.

OPEN FILE
DOSSIER PUBLIC
840
1982
GEOLOGICAL SURVEY
COMMISSION GEOLOGIQUE
OTTAWA