



MINISTÈRE
DE L'ÉNERGIE
ET DES RESSOURCES

DIRECTION GÉNÉRALE DE
L'EXPLORATION GÉOLOGIQUE
ET MINÉRALE

RED DOG LAKE AREA.

R.O. Freedman

REPORT
on
RED DOG LAKE AREA

by
R. O. FREEDMAN
(J. A. PHILPOTTS)

PUBLIC

INTRODUCTION

Ministère des Richesses Naturelles, Québec
SERVICE DES GITES MINÉRAUX
DP-49 ~~DP-49~~
No GM- ~~DP-49~~ 18

Red Dog Lake area, Ungava, occupies some 650 square miles. It is bounded by latitudes 59°00' and 59°30' N, and by longitudes 69°50' and 70°20' W; a small additional spur is bounded to the north by latitude 59°35' and to the west by longitude 70°00'. The eastern border of the area is three miles west from the mouth of the Red Dog river on Hopes Advance Bay. The area was mapped geologically during the summer of 1958.

The most practical means of access is by float-plane, the nearest base being Fort Chimo which is 100 miles south-southeast. In addition, access may be gained by portaging from the Hopes Advance Bay airstrip, which can handle DC-3 aircraft.

The southeastern part of the Red Dog Lake area has a ridge and valley topography trending NW-SE. The ridges, which

are in places 600' above sea-level, consist of basic igneous rock; the valleys are underlain by less-resistant meta-sediments. To the west and throughout most of the northern half, the outcrops are of granite and a rolling topography prevails. The granite is generally bordered by iron formation and associated rocks, and these tend to be ridge-makers.

Superposed upon the bedrock-controlled topography are abandoned beaches and kame terraces, some of the latter being about 200' high. In spite of the widespread Pleistocene cover, outcrops are abundant.

Rivers in the area flow northeast toward Ungava Bay, following the glacial direction of 040° . The local drainage pattern is of the deranged trellis type. Lakes are abundant.

Shrubs are rare and dwarfed. Game is scarce, although foxes, ptarmigen and many geese were seen; fishing is good. There are no Eskimos dwelling within the area, however, during the summer, some do live at Merganser point on Hopes Advance Bay.

GENERAL GEOLOGY

The bedrock exposures in the area are all of Precambrian age. Basement gneisses are overlain to the east by sedimentary and volcanic rocks of the Labrador geosyncline. The younger rocks generally trend north-south but have been complexly folded and faulted. Diabase dikes and meta-gabbro sills are the youngest rocks in the area.

TABLE OF FORMATIONS

| | | |
|--------------|---------------------------|---|
| CENOZOIC | Recent and Pleistocene | River deposits, beach deposits; moraine, eskers, kame terraces. |
| Unconformity | | |
| PRECAMBRIAN | Proterozoic | Diabase dikes Granite (?) Amphibolites and meta-gabbros |
| | | Intrusive contact (?) |
| | | Meta-volcanics <u>Meta-sediments</u> quartz-mica schist, quartz-chlorite schist, phyllites, quartzites. <u>Iron-bearing sequence</u> Upper member, oxide member, basal member. |
| | | Unconformity |
| | Archean | <u>Basement Gneiss Complex</u> granite and granodiorite gneiss. |

Basement Gneiss Complex

Basement gneisses are the most abundant rocks exposed; they underlie the western and most of the northern parts of the area. In the field three groups were distinguished: pink leucogranite, granite gneiss, and granodiorite gneiss.

The pink leuco-granite is composed of potassic feldspar, quartz (30%), minor oligoclase and accessory biotite. Gradational with this rock-type are grey and pink granite gneisses containing up to 30% biotite. The textures of both rock-types range from granitic to porphyritic. Generally two feldspars are present, although the occurrence of perthite alone is not uncommon.

The granodiorite gneiss is characterized by green andesine, orthoclase, and commonly blue quartz (rutile inclusions?). Hornblende is somewhat more abundant than biotite in the mafic phases, which usually make up 25% of the rock. The texture typically tends towards porphyritic.

Amphibolite inclusions containing roughly 70% hornblende, quartz and minor plagioclase occur in low abundance in the basement complex. They are most common in the tongue of granite that extends eastwards north of Red Dog lake.

Iron-bearing Sequence

The iron-bearing sequence unconformably overlies the basement gneisses. The sequence is not everywhere the same. In addition, its members and sub-members are very irregular in thickness and mineralogical composition.

Basal Member

Quartzite is the basal member of the iron-bearing sequence. It varies in thickness from 0 to 100' or more. In places the rock is an almost pure quartzite but elsewhere it grades into quartz-mica schist. The texture is fine to medium grained. Magnetite is a universal accessory. In the vicinity of Red Dog lake the basal member contains a significant amount of iron silicates.

Oxide Member

The oxide member consists of quartz with various amounts of specular hematite, hematite and magnetite, and magnetite. The hematite bearing beds are in general quite friable, whereas the quartz-magnetite beds tend to be massive. Towards the top of the member, iron-amphiboles are abundant, and in places form continuous bands.

Upper Member

Iron-silicate beds, grey and brown quartzites, and spotted carbonate quartzites overlie the oxide member. The iron-silicate rocks consist of grunerite ($2V=81^{\circ}$, $ZAC=10^{\circ}$),

actinolite, magnetite, quartz and garnet. The quartzites are generally grey, massive, and contain minor amounts of iron silicates and oxides. The spotted carbonate rock consists of white, sugary quartz with nodules of siderite; in the brown quartzites, the carbonate is distributed evenly; iron-amphiboles are accessory.

Meta-sediments

The upper member of the iron-bearing sequence grades up into schists. These schists are fine grained and consist of quartz, biotite, muscovite and in places garnet. Higher up in the series quartz-chlorite schists, quartz-muscovite schists, and aphanitic, light green phyllites also occur; quartzite is rare. The meta-sediments underlie a considerable area, but owing to their low resistance (relative) to weathering and erosion, outcrops are not abundant. Amphiboles are rare.

Basic Extrusive and Intrusive Rocks

Basic igneous rock, in conformable bodies, makes up about half of the outcrops in the southeastern portion of the area. It is a ridge-maker, and commonly caps meta-sediments. The petrogenesis of this igneous material is not certain. Some of the rock is uniformly fine grained (ie. the most eastern occurrence) and is probably of volcanic origin. On the other hand, the degree of differentiation that has occurred within some of these bodies suggests that they are sills.

Rock-types range from amphibolites containing normal hornblende and quartz (meta-peridotites?), to meta-gabbros consisting of up to 60% plagioclase (An_{40}), hornblende and minor quartz. Magnetite and pyrite are the common accessories. Serpentine is rare.

Granite

Small occurrences of granite were observed within the meta-sediments. These may indicate a minor phase of acid igneous activity; their distribution does in fact suggest diapir intrusion. They might, however, be basement domes.

Diabase Dikes

Several diabase dikes were mapped. The diabase was medium grained and relatively unaltered. The dikes trended a few degrees west of north, which is the expected direction, deduced from the fault pattern, for tension joints.

Pleistocene

Glaciation has had a marked effect upon the regional topography. Large-scale grooves, stream valleys, roches moutonnés, plucked surfaces and striations indicate that the direction of movement of the ice was about 040° . There are several large eskers in the area; they vary in content from boulders to fine sand. Abandoned beaches and large kame terraces are fairly numerous. In general, the Pleistocene cover is thin.

STRUCTURE

Foliation in the granite gneiss is generally not conformable with the strike of the meta-sediments. This indicates an unconformable contact. However, it was commonly observed that a sympathetic foliation, parallel to the contact, occurred in the gneiss immediately adjacent to the overlying sediments. This is suggestive perhaps of plastic flow within the gneiss at some time after the deposition of the sediments.

The dominant foliation trend in the area is about 325° . This can be related to both folding and faulting.

Folds

Folds within the area are most conspicuous at the gneiss-metasediment contact. At present, the extent of plastic flow during the folding can only be conjectured. Fold axes plunge southeast at 25° to 30° . Axial planes dip northeast; some of the folds, such as the large syncline at the west end of Ford lake, are overturned. The folds are of all sizes.

Faults

Several shear zones and minor faults were observed in the field. Air-photographs, however, reveal a striking set of sub-parallel linears (non-glacial); these are probably faults.

The dominant set of linears strike approximately northwest-southeast. Structural analysis of joint patterns in outcrops along these inferred faults indicates (1) that the dip is about 50° northeast, and (2) that the hanging-wall moved down slightly, and to the southeast. Rock structures are terminated to some extent by these linears. A striking example of this occurs in the southwest corner of the area where members of the iron-bearing sequence end abruptly against a shear-zone of augen-gneiss and phyllonites. There seems, however, to have been little motion along most of the linears.

In general, the inferred fault system and the attitude of the diabase dikes are in fair agreement with the pattern that occurs throughout much of northern Quebec.

ECONOMIC GEOLOGY

Iron

Iron ore occurs in many places within the iron-bearing sequence. It is most abundant and of highest grade in the thickened troughs and crests of folds.

The distribution of the iron formation, although complicated by folding, strongly suggests deposition in sedimentary basins that probably were not continuous.

Gold

Four samples from a large quartz-vein north of Ford lake were analyzed for gold; the results were negative.

Sulphides

Grains of pyrite and of pyrrhotite are widely disseminated in the basic igneous rocks. No concentrations were observed.

LEGEND

Proterozoic

- 5 Granite
- 4 Diabase dikes, metagabbro, metavolcanics, amphibolite

Metasediments

- 3d Quartzite
- 3c Phyllite
- 3b Quartz-chlorite schist
- 3a Quartz-mica schist

Iron-bearing sequence

- 2e Undifferentiated
- 2d Quartzite with siderite nodules
- 2c Iron-silicate rock
- 2b Quartz-magnetite-hematite iron-formation
- 2a Quartzite

Archean

- 1 Basement gneiss complex: granite and granodiorite gneiss

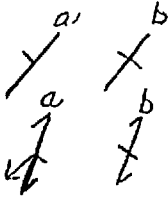
Ministère des Richesses Naturelles, Québec

SERVICE DES GITES MINÉRAUX

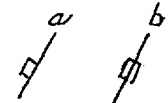
No. DIP-49 27005
GM-

SYMBOLS

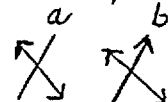
Outcrop; group of outcrops



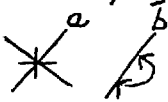
Strike and dip of bedding: (a) inclined, (b) vertical



Strike and dip of foliation: (a) inclined (with lineation),
(b) vertical



Strike and dip of joints: (a) inclined, (b) vertical



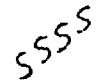
Anticlinal fold axis: (a) normal, (b) plunging



Synclinal fold axis: (a) normal, (b) overturned



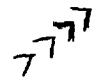
Linears



Inferred faults



Glacial striae



Esker



Direction and plunge of drag-folds

Magnetic declination 39° to 40° West

Geology by R.O. Freedman and J.A. Philpotts, 1958

Red Dog Lake Area, New Quebec