P. R. NO. 433

PROVINCE OF QUEBEC, CANADA

DEPARTMENT OF MINES

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MINERAL DEPOSITS BRANCH

PRELIMINARY REPORT

ON THE GEOLOGY OF

MOUNT MEGANTIC

COMPTON AND FRONTENAC ELECTORAL DISTRICTS

BY

A. M. REID

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INTRODUCTION

The area covers about 60 square miles and is bounded by latitudes 45°24' and 45°30' and by longitudes 71°05' and 71°15'. It includes parts of Hampden, Marston, Ditton and Chesham townships in Compton and Frontenac electoral districts. Megantic mountain is 95 miles south of Quebec City and 120 miles east of Montreal. Mapping was carried out at the scale of 1,320 feet to the inch.

Megantic mountain rises to a height of 3,500 feet above sea level. The mountain extends over 35 square miles and rises abruptly from a relatively flat plain where the minimum elevation is close to 1,225 feet along Salmon river. Thus, the maximum relief is about 2,300 feet. The topographic form of the mountain is that of a circular steep ridge separated by a wide valley from a gently sloping, high central massif. Most of the drainage in the area is toward Salmon river, which empties into the St-Francis river near Weedon.

The area outlined above forms part of the Mount Megantic Area described by McGerrigle* in 1934.

GENERAL GEOLOGY

The igneous rocks of Megantic mountain are intrusive into metasedimentary rocks of the Compton formations which comprise shales and siltstones that have been regionally metamorphosed to slates and foliated quartzites of variable purity. Around the intrusive complex a thermal metamorphism has been superimposed upon the regional metamorphism. The southeast corner of the map-area is underlain by greenstones of the Frontenac formation.

The mountain itself is composed of three main rock types: granite, gabbro and syenite. The granite occupies the

*McGerrigle, H.W., (1934) - Mount Megantic Area; Que. Bur. of Mines, Ann. Rept. 1934, Part D.

central part of the mountain and is partially surrounded to the northwest, north, east and southeast by gabbro. The syenite forms a nearly complete ring encircling the granite and the gabbro.

Pleistocene till lies in a continuous mantle over much of the area.

Table of Formations

CENOZOIC	Recent and Pleistocene	Clay, till, sand and gravel
PALAEOZOIC	Late or Post-Devonian igneous rocks	Dyke rocks Granite Syenite Gabbro
	Lower Devonian	Greenstone (Frontenac formation)
	Lower Devonian or Upper Silurian?	Slate and quartzite (Compton formation)

Compton Metasedimentary Rocks

The Compton formation seems to underlie most of the area surrounding the mountain. It consists of interbedded quartzite and slate. The fine- to medium-grained foliated quartzites are grey to brownish grey and contain abundant spots of rust. Some thin beds of argillaceous quartzite show well developed cross lamination. The slates are lustrous, blue grey to black with abundant pyrite cubes, especially along cleavage planes. Slate and quartzite beds are from one inch to 2 feet thick with occasional quartzite beds up to 15 feet in thickness.

Frontenac Metavolcanic Rocks

The southeast corner of the map-area is underlain by metamorphosed volcanic rocks of the Frontenac formation. These contain abundant chlorite and are fine- to medium-grained greenstones with few, poorly developed pillow structures. Epidote and quartz-epidote lenses are common.

Granite

The granite underlies all of the central part of the mountain and extends over more than 10 square miles. It is pink to beige in colour, coarse grained and porphyritic with subhedral pink feldspar laths set in a groundmass of grey plagioclase feldspar, quartz, biotite and magnetite. The phenocrysts are orthoclase microperthites. The granite is homogeneous except near its margins where the groundmass is fine grained and small drusy cavities containing quartz are common.

Gabbro

The gabbro occupies the low-lying ground between the central granite and the syenitic rim. It is a coarse-grained grey to blue grey rock commonly containing large mafic phenocrysts. The most abundant mineral in the gabbro is a blue grey plagioclase. Amphibole, pyroxene and biotite are usually present but their amounts vary from place to place. Amphibole frequently occurs as large poikilitic phenocrysts enclosing feldspar. A high magnetite content is typical of the gabbro and the weathered surface of the rock is rusty.

Syenite

The syenite forms a steep-sided ridge encircling the central part of the mountain except to the southwest. The ring attains a maximum width of more than half a mile. The fresh rock of the core of the ring is very coarse grained and green and it weathers to a brown or white colour. It is composed of green orthoclase microperthite with a small proportion of ferromagnesian minerals. In thin section, biotite, amphibole, pyroxene, olivine

and zircon can be distinguished. As the outer margin of the ring is approached the grain size decreases and quartz becomes an important constituent. Its content increases rather erratically toward the contact with the Compton metasedimentary rocks. The rock is well jointed and at the outer margins a parallel alignment of feldspar laths can be locally discerned.

Dyke Rocks

Some acidic and basic dykes and possibly a few sills occur in the outer portion of the mountain and in the Compton formation around the intrusive rocks of the mountain.

Age Relations

Marleau* concludes that the Compton metasediments can be correlated with the sediments of the Moose River group in Maine and are thus of Upper Silurian or, more probably, of Lower Devonian age. The Frontenac metavolcanics are thought to lie stratigraphically above the Compton formation and are also assigned to the Lower Devonian.

The Mount Megantic syenite is intruded into the gabbro and contains xenoliths of it. The contact between these two units is locally gradational, suggesting that they are almost of the same age. Evidences discovered during the field work and through subsequent studies of rock specimens suggest that the granite is the youngest of the three intrusive units.

Pleistocene

The Pleistocene ice sheet overrode the Megantic mountain, moving from northwest to southeast. Till covers most of the area and is of an appreciable thickness around and on the lower slopes of the mountain. Outwash gravels and sands occupy most of the stream valleys.

STRUCTURAL GEOLOGY

Folds

The metasedimentary and metavolcanic rocks have been isoclinally folded along a northeast-southwest axis. In the northwest part of the map-area the folding is very tight and the strata dip at high angles to the northwest. Overturning is common. To the southeast, folding is more open, though dips are still steep, and reversals of dip direction are common. Minor crenulations in the slate plunge at low angles to the northeast and to the southwest. The axes of larger drag folds plunge at approx-

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*Marleau, R.A. (1959) - Age Relations in the Lake Mégantic Range, Southern Quebec; Annual Meeting, G.A.C., Toronto, 1959.

imately 15° to the southwest. The Compton and Frontenac formations are believed by Marleau (1959)* to form part of the north limb of a northeast-southwest trending synclinorium.

Structure of the Igneous Complex

The contact between the syenite and the metasediments is sharp and dips toward the centre of the mountain at approximately 45°. If the attitude of this contact does not change radically with depth, the syenite has the form of a thick cone sheet. The inner margin of the syenite, where in contact with the central granite, dips steeply towards the centre of the mountain. The picture suggested is thus that the two outer rock units, possibly cone shaped, are wrapped around a funnel-shaped central granitic mass. Joints are particularly abundant in the syenitic ring and in the southwestern portion of the granitic core.

Thermal Aureole

Where the exposures permit, the approximate limits of the thermal aureole can be traced around the intrusive. Thermal effects can be discerned as far as one mile from the border of the igneous rocks into the slates and quartzites of the Compton formation. The thermal aureole does not extend into the metavolcanics of the Frontenac formation.

The purer quartzites of the Compton formation show no change other than the development of irregular, closely spaced joints. At the outer limits of the aureole the slates and more argillaceous quartzites have been changed to hard, black, fine-grained hornfels in which original sedimentary structures are still preserved. Immediately near the contact with the igneous rocks the hornfels contain spots rich in small biotite flakes and andalusite is present in places near the syenite.

ECONOMIC GEOLOGY

Building Stone

The Mount Megantic syenite has been quarried in small amounts at four places near its contact with the metasedimentary rocks in the northwest part of the mountain. The largest of these quarries has been worked sporadically in the last years but is now idle. The stone was used for monuments and for ornamental purposes. Unfortunately it rapidly loses its attractive green colour when exposed to the atmosphere.

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*Marleau, R.A., (1959) - Ref. cited p.4.

Gold

Placer gold has been reported to occur in the area and particularly in the stream deposits to the south of Megantic mountain. Descriptions of these occurrences of alluvial gold are given in McGerrigle's report*.

Quartz Veins

Quartz veins are not uncommon within the map-area, especially where thermal metamorphism has allowed accretion of quartz along cleavage planes in the metasediments. Within the Frontenac metavolcanics, veins and lenses of quartz contain small amounts of magnetite and epidote. The quartz veins are usually barren though traces of gold, silver and lead have been found in this and in adjacent areas.

Pyrite

Disseminated pyrite was encountered in two diamond drill holes put down in 1958 in the southwestern part of the area.

Sand and Gravel

Sand and gravel accumulations are common in stream valleys and on the low-lying ground immediately adjacent to the mountain. Nearly all of them are very poorly sorted.

*McGerrigle, H.W., (1934) - Ref. cited p.1.