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NOTES ON THE STRUCTURE OF THE CADILLAC-BOURLAMAQUE AREA, ABITIBI COUNTY, QUEBEC

(REPORT AND MAP)

By

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O T T A W A, 1 9 4 3

C O N T E N T S

Illustration

NOTES ON THE STRUCTURE OF THE CADILLAC-BOURLAMAQUE AREA, ABITIBI COUNTY, QUEBEC

INTRODUCTION

The accompanying generalized geological map presents the broader features of the geology of the Cadillac-Bourlamaque mineral belt. Detailed maps of this belt are available[1] and

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[1] Gunning, H. C.: Cadillac Area, Quebec; Geol. Surv., Canada, Mem. 206.
Gunning, H. C., and Ambrose, J. W.: Malartic Area, Quebec; Geol. Surv., Canada, Mem. 222.
Norman, G. W. H.: Geol. Surv., Canada, Papers 41-6, 42-9, 42-12, and 43-2.

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show the location and character of bedrock that outcrops with comparative rarity above the general level of clay and sand that blankets this region. The scales of these maps are, however, too large to permit of their assemblage to bring out important relationships of regional structures. A map illustrating the broader geological features of Cadillac and Malartic areas accompanies the report[2] on the Malartic area.

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[2] Gunning, H. C.: Op. cit., Figure 1.

The present map fulfils a similar rôle for Dubuisson and Bourlamaque townships, and includes Malartic and Cadillac areas to show structural changes that take place at the Malartic-Dubuisson boundary. Although no attempt is made here to discuss mineral deposits, the close connection between mineral deposition and structure is shown to some extent by the concentration of mines in certain belts. Many parts, some quite large, of the Cadillac-Bourlamaque area are covered with overburden, and mineral exploration in them must depend largely on information gained by drilling. A principal purpose of the accompanying map is to furnish an approximate guide to the structures and rocks underlying these drift-covered parts, as inferred from information secured in adjoining, better exposed or drilled parts of the area.

PRECAMBRIAN SUCCESSION OF CADILLAC-BOURLAMAQUE AREA

The Precambrian rocks of the district consist of folded and faulted, Archaean (Early Precambrian), volcanic and sedimentary rocks, and of several types of intrusive rocks of more than one age. Prior to field work in 1934, 1935, and 1936 the Archaean rocks had been subdivided into the Keewatin and Timiskaming series. The older, Keewatin series, was considered to be a thick accumulation mainly of volcanic rocks, but included some of sedimentary origin, whereas the Timiskaming series was believed to comprise chiefly sedimentary rocks. Gunning and Ambrose found that in Cadillac and Malartic areas it was impracticable to adopt this dual classification because the rocks formed a thick and, apparently, a conformable succession of strata without a break to indicate the Keewatin-Timiskaming boundary. Instead, they divided the Archaean rocks into four groups, believed to be conformable,

and consisting, in order beginning with the oldest, of:

(1) Malartic group--chiefly volcanic rocks
(2) Kewagama group--chiefly sedimentary rocks
(3) Blake River group--chiefly volcanic rocks
(4) Cadillac group--chiefly sedimentary rocks

The validity of this subdivision rests on the assumption that none of the various belts of volcanic or sedimentary rocks has been repeated by faulting.

In Dubuisson township the Blake River group forms a single belt faulted in between two belts of the Kewagama group. Owing to these faults, it is not possible to determine the stratigraphic position of the Blake River rocks with respect to adjoining Kewagama strata. Across Cadillac and Malartic townships, the rocks along the Blake River and Kewagama contacts are intensely sheared, which may be ascribed also, perhaps, to faulting. The relative age of the two groups in the Cadillac-Bourlamaque area is, therefore, not yet clearly established. The possibility that the Blake River group may underlie the Kewagama group and be the Malartic group repeated by faulting, is indicated in the legend of the accompanying map by placing the Blake River group to the right of the main column, and by replacing the name "Malartic group" by "Blake River(?) group". If the Blake River group is merely a faulted repetition of the Malartic group, it follows that, similarly, part of the Cadillac group may represent the Kewagama group. Field work by Wilson[1] in Rouyn township suggests a possibility

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1 Wilson, M. E.: Geol. Surv., Canada, personal communication.

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that the Cadillac group may consist of two groups separated by an unconformity. If this is so, the Kewagama group would be that part of the Cadillac group that lies beneath the unconformity.

In Cadillac area[2] the rocks in the southern belt of

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2 Gunning, H. C.: Op. cit., p. 19.

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greywacke were mapped as "Fournière sediments" and were not correlated with the greywacke in the northern belt mapped as "Kewagama sediments". The correlation of the rocks in these two belts as the "Kewagama group" was made in Malartic township[3], where the structure was interpreted as synclinal. In

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3 Gunning, H. C., and Ambrose, J. W.: Op. cit., p. 14.

Dubuisson and Bourlamaque townships the two belts of the Kewagama group are separated by a faulted zone of talc schists, and though very similar in lithology may be of different ages.

STRUCTURE OF CADILLAC-BOURLAMAQUE AREA

The detail mapping has shown, as indicated on the accompanying map, that the volcanic and sedimentary rocks are distributed mainly as narrow belts with a regional east to southeast trend. The rocks in these belts dip nearly vertically or are overturned, and in many places have been so intensely sheared that the attitude of beds cannot be determined. Lack of information regarding the attitude of beds in many places and the true succession of Archaean strata necessitates certain assumptions in attempting to interpret the structure that controls the distribution of belts in the area.

The structure in Cadillac and Malartic townships could be a comparatively simple syncline if faulting were assumed to be only a minor feature. The Cadillac fault zone along the north side of the southern belt of Kewagama rocks, however, has been traced, except for minor gaps, from near the centre of Bourlamaque township westward across Dubuisson, Malartic, Cadillac, Rouyn, and other townships to link apparently with a similar structure that extends across Larder and Kirkland Lake districts. This fault is much too extensive to regard as of minor structural significance and appears to have cut off part of the south limb of the main synclinal structure across Cadillac and Malartic townships. Intense shearing and carbonatization along the contact between the north belts of Blake River and Kewagama rocks, in Malartic and Cadillac townships, suggests that the north limb of this structure also may be cut off by a fault. If these faults are correctly interpreted as playing an important part in the structure, the volcanic and sedimentary rocks in these two townships would form a succession of faulted folds whose limbs have been partly eliminated by intense shearing.

The evidence for interpreting the structure as a succession of tightly compressed and faulted folds is even more impressive in the east part of Dubuisson and Bourlamaque townships. The volcanic belts there show marked divergences in strike across concealed intervals, and include zones of schists wider than normal fault zones; apparent thicknesses increase eastward more rapidly than can be ascribed to original deposition; and duplications of belts of identical strata occur. All such features would be expected to characterize close, incompetent folds sliced by faults. These features are particularly well displayed in the belts of rock extending east, just south of the Provincial Mine School, past Lamaque and Golden Manitou mines.

The Cadillac fault, or a branch of this fault, is shown extending eastward from the south Blake River belt, in Cadillac township, to the north Blake River belt in Malartic township. The basis for assuming this extension is the plentiful occurrence of arsenopyrite along the Cadillac fault zone in Cadillac township and along this fault zone across Dubuisson and Bourlamaque townships. In Malartic and Fournière townships arsenopyrite occurs along the north Blake River belt, but not along the south belt. The Cadillac fault in Cadillac township, the north Blake River belt in Malartic township, and the Cadillac fault zone in Dubuisson township are in line, and the distribution of arsenopyrite along this line, and very rarely elsewhere, strongly suggests a continuous, connected channelway such as would be provided by a fault. Within the area where this assumed fault would cross the belt of Cadillac sediments the directions of strike of the strata and direction of synclinal axes do not rule out the possibility of the presence of a fault. The location of the assumed fault may

be marked by albitite and quartz albitite dykes such as are shown on the Malartic map[1] and occur along the Cadillac fault

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[1] Gunning, H. C., and Ambrose, J. W.: Op. cit., Map 575A, sheet 4.

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zone farther west.

The granodiorite plug at the Siscoe mine, on Dubuisson Lake, is cut off southward by a strong, steep, north-dipping shear zone 60 feet wide, known as the "K zone". This zone strikes north 60 degrees west and is in direct alinement with a fault, striking southeast, at the southeast corner of La Motte Lake. Farther northwest, near the southwest corner of La Motte Lake, is a narrow belt of conglomerate and greywacke faulted to the south against greenstone. These faults may be parts of one major fault zone parallel to the Cadillac fault zone farther south. There are, however, large gaps, concealed by overburden or water, between these faults, and no attempt has been made to find out whether they are parts of one continuous fault or represent a series of parallel faults.

In passing east from Cadillac township the belts of volcanic and sedimentary rocks, like an imperfect Z, are flexed first to the south, at Cadillac-Malartic boundary, and then to the north, near the centre of Dubuisson township. These flexures developed after the period of regional faulting and folding and appear to have given rise to a fracture and fault system trending northeast that controls the location of the late Precambrian diabase dykes. As all belts northward across the area are affected by these flexures, it would be expected that all faults and folds would be similarly affected. The eastern extension of the K zone from the Siscoe mine should, therefore, swing northward if it does not fade out.