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OUTLINE OF THE ROUYN-NORANDA AREA

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OUTLINE OF THE ROUYN-NORANDA AREA

QUEBEC

BY

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AN OUTLINE OF THE NORANDA DISTRICT

The last paper on the Rouyn-Noranda district presented to the Prospectors and Developers Association dates back to 1951. #Since that time, detailed geological mapping by the Quebec Department of Natural Resources and by mining companies has provided a base for a new compilation and new interpretations by local geologists. It is this new material that we wish to bring to your attention.

In 1951, there were thirteen producing mines in the Noranda area. Today there are seven. All the mines closed were marginal gold producers and the value of production has not substantially decreased since that time. An old mine, the Waite Amulet is near its end this year, but a new one, Lake Dufault will be on its way into production. This new discovery of high grade copper-zinc ore has brought much interest and has shown that the Noranda area is still a good place to look for new mines.

The Noranda district is located within the border of the Canadian Shield and near the center of a belt of folded volcanic and sedimentary rock that extends from east of Chibougamau to west of Kirkland Lake, Ontario.

W.G. Robinson: The Structural Geology and Ore Deposits of the Rouyn-Noranda district.

The accompanying map shows the broad regional geology between Rouyn, Noranda, Vald'Or and Mattagami Lake - Joutel area. This includes an area between latitudes 48 and 50 degrees. On the west is the Ontario-Quebec provincial border and the east is marked by a line south from Urfé township, near longitude 76° 30'.

This geological map includes three new areas that have recently been mapped by the Quebec Department of Natural Resources and the general geological boundaries are shown for the first time. The new map-areas include: Collet and Laberge townships by R. Davies; a broad area north to Manthet and west to Subercase - Joutel townships; and the row of townships including Manthet east to and including Laforest township. Both these areas were parts of an helicopter mapping project under the direction of J.H. Remick.

This map gives a general geological picture of the folded belts of volcanic and sedimentary rock intruded by diorite, gabbro, peridotite bodies, by large, irregularly shaped granitic masses and by the regional diabase dykes. There are two main sets of diabase dykes, one striking northeasterly, more or less parallel to the Grenville front. Narrower dykes in the western part of the area strike about north-south.

The volcanic rocks have interbedded pyroclastic tuffs, agglomerates and breccia bands with greywacke, quartzite, arkose, conglomerates and iron formations. The general strike is east-west.

Publications contain conflicting numbers of main folded belts of volcanic and sedimentary rocks suggested for this area. However, with the present stage of geological maps completed at 1 mile to 1 inch, there is a suggestion that the area is one in which there is an overlapping and interfingering of a group of shield type volcanoes. Thus, individual belts might be non-existent or would be difficult to determine. There are several sedimentary belts. The largest is a northern belt containing iron formations with maximum extent in Montgolfier township. Another more southern belt containing iron formations passes eastward through Dieppe and Casa Berardi townships. There is also a central discontinuous belt with minor iron formation extending eastward from Desmeloizes and beyond Delestre township. The Noranda area contains two belts of sedimentary rocks and was recently suggested by Bass# to be a clearly outlined volcano.

Bass Manuel N. (1961) Regional Tectonics of Part of the Southern Canadian Shield, Jour. Geol. Vol 69, No. 6, Nov. 1961, pp. 668-702.

It is bounded on the north by the Duparquet sedimentary rocks and the Destor fault and to the south by the Beauchastel, Bousquet and Rouyn township conglomerates and the Larder Lake - Bouzan Lake fault.

The volcanic rocks are wedged towards the east between the sedimentary bands of Clericy, La Pause, Bousquet, Joannes and Cadillac townships.

The older sedimentary rocks in the south of the map area are overlapped by the Proterozoic Cobalt sedimentary series. East of the Cobalt in Quebec, a deformed sedimentary sequence 10 miles wide has been mapped by M.E. Wilson as the Pontiac group. It is overlain with angular unconformity by another sedimentary group, the Temiskaming series.

The compilation map of the Noranda area is on a scale of 1 mile to 1 inch and is made up of nine townships. They include: Hébécourt; Montbray; Dasserat; Duparquet; Duprat; Beauchastel; Destor; Dufresnoy; and Rouyn. All of these townships have been previously mapped on a scale of 1,000 feet to 1 inch with many sections having been mapped in more detail; 100, 200, and 400 feet to 1 inch have been the most popular scales chosen. All this detailed information, where possible, is included in the 1 mile to 1 inch compilation, eventually to be published by the Mineral Deposits Branch of the Quebec Department of Natural Resources.

GENERAL GEOLOGY

Rock types

The lavas of the Noranda district have a considerable range in composition and phases and have been distinguished largely as basalts, andesites, dacites, trachytes, rhyolites, and associated pyroclastic rocks which include agglomerates, breccias and tuffs.

The textures of the lavas are both porphyritic and equigranular. Fragmental, amygdaloidal, ropy and ellipsoidal structures are common and pillow structures have served as indicators of the top and bottom of the many flow units.

Both dykes and sills of quartz-diorite, diorite and related gabbro are abundant and represent the oldest intrusive rocks. They form irregular bodies having a tendency to follow the general structure, occasionally have cross-cutting relationships. Some are steeply dipping others, with irregular contacts, are almost flat.

The diorites have been terminated by the granitic intrusive rocks. The Flavrian Lake, Powell granite and Lake Dufault granodiorite are the largest of these bodies. Syenite, syenite porphyry and monzonite form smaller masses.

Basic dykes, frequently referred to as quartz gabbro, olivine gabbro or diabase are regional in extent.

Some of these dykes have been traced for distances greater than 100 miles. Some of the diabase dykes in the Noranda area cut the Cobalt series and others are overlain by the Cobalt so they have been considered to be contemporaneous with the Cobalt deposition.

Structure

The volcanic rocks in the Noranda area have been folded with varying degrees of intensity along east-west axes. The folds appear as doubly plunging structures to the east and west. Broad open folds occur between the east side of the Flavrian Lake granite and the west part of the Lake Dufault granodiorite. The folding becomes closer with steep dips and some overturned sections northeast of the Lake Dufault granodiorite. In the township of Montbray and westward across the provincial border, the volcanic rocks have a broad open folding, and a gently plunging synclinal and anticlinal structure can be recognized. In Hébécourt and Duparquet townships, where the axes of the folds come close together, the dips are steeper. Southwest of the Flavrian Lake granite, the dips are steep to the south and swing from a southwest direction to southeast where the volcanic flows adjoin the Flavrian Lake granite. This is a steeply plunging broad anticlinal structure and may be a displaced portion of the anticlinal structure to the west across the Milky Creek - Hunter Creek fault.

The Duprat anticline may be similarly displaced by a left hand movement along the same fault.

Minor synclinal and anticlinal axes have been identified near the southern border between Dasserat Lake and the old Aldermac mine.

A structural feature brought out by this compilation is an important fault wedge limited by the Milky Creek - Hunter Creek fault on the north and the Larder Lake-Bouzan Lake fault on the south.

This wedge contains the larger granitic masses, the Flavrian Lake, Dufault Lake, Powell and Aldermac which can be accounted for by uplift and deep erosion.

The block northwest of the Milky Creek fault has some granitic stocks. Some are broken through and have been partly eroded, others are covered by a thin veneer of volcanic flow units. The exposed granitic stocks of Colnet Lake and Tarsac Lake in Montbray township have broad clearly outlined alteration halos and in the same township circular areas have a similar alteration and only granitic stringers have reached through to the surface. This evidence strongly suggests that granitic stocks are close to the present surface and have not been eroded as deeply as the Flavrian Lake Dufault Lake and Powell stocks.

It may be fortuitous, yet the large and important ore bodies in the Noranda area are contained within the fault wedge marked by the Milky Creek - Hunter Creek and the Bouzan-Larder Lake Fault.

When all the recorded faults are compiled for the Noranda area, they will line up with just about all points of the compass, but the major fault sets may be reduced to a few:

1) The major east-west faults are represented by the Cadillac-Bouzan Lake fault. They have wide shear zones and were the loci of repeated movements over a long period of time.

2) The northwest striking faults, the most extensive being the Smoky Creek fault. This fault seems to have a vertical rather than horizontal movement. Other faults having about the same direction show great horizontal displacements and may not be of the same age.

3) A definite set of northeast striking faults. They include the Hunter Creek fault and numerous faults particularly north and northwest of Noranda. They have pronounced left hand horizontal displacements and obviously displace the northwest faults.

4) In the Lake Dufault area a north to slightly west of north fault set is the latest faulting movement.

The movement has a pronounced vertical movement estimated to be about 1000 feet, east side up.

The relative age of the various fault sets as a whole and the movement along them is not too well established. Detailed studies have been limited to a few localities.

Glacial Geology

Surficial deposits of clay, sand and gravel have been deposited within many of the low depressions and at higher elevations (1100') in the Noranda Area. Kames, eskers, kettles, raised beach gravel deposits all occur in the area. In addition, relatively vast outwash sand plains with attendant eskers, multiple elevated beaches, and areas of barchane dunes extend south through the central part of the map-area.

The glacial striae have been fairly well recorded for the area. Those prospectors concerned with the tracing of glacial boulders as an aid to ore prospecting may find such information useful. There are still reported boulders of ore grade in the Noranda area that have not as yet been traced to their source.

GENERAL GEOLOGY OF THE MINES AREA

The rocks within the sphere of influence of the present operating mines are all igneous with perhaps the exception of fine layers of chert, and consist of acid and basic volcanic and intrusive rocks.

The volcanic rocks are mapped as rhyolite and andesite, although there are considerable variations exhibited by each type. The oldest intrusive rocks are abundant dykes and sills of quartz diorite which are cut off by the Lake Dufault granodiorite stock. Diabase dykes appear as the latest intrusive igneous rocks.

The volcanic rocks of the area between the Flavrian Lake granite and the Lake Dufault granodiorite dip from 30-50 degrees in a general easterly direction, and successive flow units overlie one another in an eastward direction except where duplication occurs with north trending block faulting. The block faulting is frequently marked by west facing scarps and occasionally by north-south diorite sills or dykes.

The main individual flow units are shown on diagram No. 4. The Rusty ridge andesite appears to be one of the earliest flow unit and is overlain by the Amulet rhyolite. The contact between the two units dips 30 degrees to the east.

There is confusing evidence concerning the contact of the Bedford rhyolite and the Rusty Ridge andesite and the contact dip ranges from 25 degrees northeast to 85 degrees southwest so its position is not clear.

The Waite andesite to the north overlies the Amulet rhyolite with an eastward dip and the Waite rhyolite is resting on the Waite andesite with a similar angle of repose.

Prior to the deposition of the thick Amulet andesite to the south some agglomerates and minor andesite flows, tuff and chert were deposited in the Amulet section.

The andesite flow unit referred to as the Nubec andesite overlies the Waite rhyolite in the north sector and is considered to be the equivalent of the Amulet andesite in the south.

The Héré creek rhyolite and the Quemont porphyritic rhyolite again overlie the Amulet andesite and Powell Pontiac andesite in the south while the Nubec andesite in the north sector is overlain by a porphyritic rhyolite. Continuing eastward the dips steepen rather abruptly from 30 to 40 degrees to 80, 90 degrees and overturning.

ORE DEPOSITS

A few statistics on the ore found to date in the Rouyn-Noranda area are shown on the following charts.

Base Metal Deposits

MINE	MINED AND RESERVES TONS	COPPER %	ZINC %	GOLD oz.ton	SILVER oz.ton
Noranda	55,000,000	2.2		0.18	
Quemont	14,500,000	1.4	2.6	0.17	1.0
Amulet A & Lower A	5,300,000	5.12	5.47	0.043	1.36
East Waite	1,500,000	4.13	3.26	0.053	0.91
Old Waite	1,200,000	4.7	2.98	0.032	0.63
Amulet C	600,000	2.2	8.5	0.017	2.53
Amulet F	280,000	3.4	8.6	0.015	1.35
Joliet	2,000,000	1			
L. Dufault	65,000	8.7		0.02	1.3
W. MacDonald	9,000,000		3		
Mobrun	3,041,000	0.62	2.32	0.052	0.62
Vauze B-1	144,000	6	4.7	0.054	2.2
Vauze B	40,000	2.5			
Despina	118,000	1.6			
N.W. Amulet	255,000	1.5			
S. Dufault	50,000	1.6			
D'Eldoma	85,000		7.7	0.17	
Aldermac	2,090,000	1.65			
Lyndhurst	156,000	1.93			
Beattie (Hunter)	129,000	1			

GOLD DEPOSITS

MINE	MINED AND RESERVES TONS	GOLD oz.ton
Powell Rouyn	3,084,647	0.13
Stadacona	3,053,420	0.16
Senator	1,837,800	0.13
Anglo-Rouyn	145,700	0.24
Donalda	1,212,000	0.2
M. Marlon	108,200	0.17
McWatters	368,000	0.33
Granada	180,000	0.2
Rouyn Merger	32,233	0.11
Chadbourne (Noranda)	1,550,000	0.13
Elder	2,000,000	0.16
Eldrich	600,000	0.14
Quesabe	115,000	0.3
Halliwell	2,718	0.43
L. Wasa	2,370,000	0.15
Arntfield	530,000	0.11
Francoeur	581,500	0.186
Duquesne	90,250	0.3
Beattie	10,650,000	0.12

Total ore amounts to approximately 124,200,000 tons.

The straight gold mines would amount to 23,900,000 tons with an average grade of 0.14 ounce of gold per ton. Including the base metal - gold mines of Noranda and Quemont, we obtain the figure of 93,400,000 tons of 0.176 ounce of gold per ton, for a total content of 16,438,000 ounces of gold.

The base metals are represented by 86,550,000 tons of copper ore at 2.2 per cent and 35,700,000 tons of zinc ore at 3.3 per cent. This gives a total of 1,900,000 tons of copper and 1,186,000 tons of zinc.

All these figures exclude the new Lake Dufault orebody.

The ore occurrences and mineralization in the Noranda district fall into two main classes: massive sulphides and vein deposits. The most important are the massive sulphides and they contain chiefly pyrite, pyrrhotite with chalcopyrite, sphalerite and gold as the ore minerals. Magnetite is found in all the sulphide deposits although in varying amounts. Gold values are not as high in the Amulet Lake Dufault section, as at Quemont and Noranda but copper zinc and silver values are in general higher.

Gold has been found in quartz and quartz-carbonate veins and in silicified shear zones. Many of the commercial grade gold deposits have been mined and only two exclusive gold producers are left.

Veins containing copper are not commonly large enough to be economically mined.

The larger orebodies of the Amulet Lake Dufault area occur exclusively along humps, folds, domes or dome shaped " rolls " or topographic " flats " in the rhyolite-andesite horizon or within andesite at or near a contact with rhyolite, quartz diorite or quartz porphyry. Basically they are contact orebodies. There are alteration zones or pipes leading from the orebodies that directionnally lead to the south or southwest, that is, toward the Flavrian Lake granite. The alteration consists of chlorite and biotite grading on the Amulet property to the cordierite-anthophyllite of the typical dalmatianite. A spatial relationship of the orebodies to the granite and granodiorite is evident. All massive sulphide orebodies excepting Mobrun are within one mile of an acidic intrusive body. We must note also that they are along or near northeast faults and a short distance from the diabase dykes. Rhyolite breccia is the most favorable rock.

The Elder and Eldrich mines, the two exclusive gold producers of the area, are located well within the Flavrian Lake Stock.

RESEARCH

In the past, research has not been very intense excepting a few projects by the Quebec Department of Mines and by mining companies. The opportunity of research is getting more and more obvious as mines become harder to find. Several mining companies and certain exploration groups have with the cooperation of the Universities begun considerable work dealing with; (1) remnant magnetism in the rocks and ore bodies (2) on Sphalerite temperatures to inquire into the nature of zoning on both a regional and detailed basis. Other studies include trace element problems and age determinations.

The remnant magnetic studies were designed to determine the attitude of the remnant magnetism. Magnetic instruments designed to record the Vertical component might feasibly miss an ore body with flat remnant magnetism. In addition corresponding magnetic directions in ore and intrusive rocks could conceivably relate the ore genetically to the rock. The conclusions arrived at suggest that the sulphides, diabases and granites are formed at quite different times since each had different magnetic directions.

Sphalerite temperatures were usually well above the Curie temperature of pyrrhotite and magnetite. Conse-

quently if the diabase and granite were present during ore formation they would be expected to have the same magnetic directions as the ore. It was found that they were all different, suggesting that the ore existed prior to the intrusion of the granite and diabase.

Samples of ore from Noranda to the Vauze mine have a similar magnetic direction which is suggestive of contemporaneous deposition.

Trace element studies have been found to be time consuming, tedious and very easily subject to contamination and consequently no real conclusions have been reached.

A collection of published age determinations has been collected and plotted on maps. It is considered as a prelude to a more detailed study which may eventually be of assistance to the geologist.

We have a record of at least 5 age determinations from the Noranda and Quemont mines and a total of greater than 80 complete rock analyses.

CONCLUSION

Though the Rouyn-Noranda area has been actively prospected and explored, the presence of concealed or deep-seated orebodies has been proven by the discovery in the last few years of the Vauze and the Lake Dufault strikes.

More orebodies should eventually be found.

The credit for the information herein presented is owed to the very many individuals who have worked in the area. We accept the responsibility for having gathered the information together and for the filling in of the gaps.