GM 13981

GEOLOGICAL REPORT

Documents complémentaires

Additional Files



Licence

License

Cette première page a été ajoutée
au document et ne fait pas partie du
rapport tel que soumis par les auteurs.

Énergie et Ressources naturelles
Québec

MINERAUX
No GM- 13981

GEOLOGY OF QUEMONT MINE

General Statement:

The summers of 1960 - 1961 were spent in a study of the geology of Quemont Mine and vicinity. This work involved regional reconnaissance, a study of reports and maps, as well as detailed surface and underground observations.

Regional Geology:

A map showing the generalized geology adjacent to Quemont is shown in Fig. 1. The oldest rocks in the area can be divided into three types. These are from oldest to youngest (1) non-Porphyritic Rhyolite and Breccias, (2) Porphyritic Rhyolite and (3) Andesite. In places the Porphyritic Rhyolite and Andesite intertongue and one of the two may be absent.

The volcanic sequence has been tightly folded along axes striking approximately N 80°E. Fractures and faults associated with the folding gave ingress to Diorite intrusions. The Powell Granite and related bodies stoped into the volcanic rocks and Diorite. Two fractures sets one striking approximately north and the other east allowed the intrusion of Diabase Dykes.

The prominent faults such as Horne Creek and Andesite are related to the Cadillac-Bouzan fault zone which in turn is a subsidiary coming off from the Grenville front. The Grenville front appears to have been active about 1000 M.Y. ago and the subsidiary faulting in the Noranda area probably took place at the same time.

Il will be noted on Figure 1, that the Porphyritic Rhyolite exhibits a very unsymmetrical and squeezed style of folding. The Quemont orebodies are formed within a westerly plunging anticline. The Porphyritic Rhyolite northeast of the mine is wrapped around in a syncline in the vicinity of the Donalda boundary. Northwest of the Quemont anticline the Porphyritic Rhyolite forms a syncline along the Joliet boundary and then wraps around the non-Porphyritic Rhyolite and Breccia that contains the Joliet orebody. The Noranda orebodies occur in a anticline within a wedge of ground bounded by the Horne Creek fault on the north and the Andesite fault on the south.

Thus the orebodies in the area are found in tight folds within non-Porphyritic Rhyolites and Breccias near contacts with Porphyritic Rhyolites or Andesites. Detailed control of each body seems to depend on the competancy of the non-Porphyritic Rhyolites and Breccias involved. The northern half of the Quemont property is underlain by non-Porphyritic Rhyolites and Breccias that are squeezed in a tight syncline in the eastern portion of the area. Judging by the location of the other ore occurrences this could be a favourable area for ore deposition. For this reason a detailed study of this surface geology was made to see if folded rock units are in fact present.

Surface Geology:

All the surface exposures on the north half of the property were studied and map prepaired to show the

interpretation of the geology is shown in Fig. 2. Massive Rhyolite flows (3 a on map legend) was found to be most useful in interpreting the detail within the non-Porphyritic Rhyolite. The style of folding may best be described as having developed as the result of intense squeezing with compression from north and south. As a result the folds are isoclinal and plunge vertically. Regional shearing and associated minor displacements parallel to the Horne Creek fault have greatly complicated the geology.

The shapes of individual units reflect the tightly folded nature of the area. Rusty zones and shearings in places are associated with breaks along the contact of two rock types. This though on a minor scale reflects the general nature of the ruptures throughout the area.

Underground

The relationships of the rocks exposed in the underground at Quemont suggest the following sequence of events:

1) Deposition of non-Porphyritic Breccias and massive Rhyolites.

2) Deposition of Porphyritic Rhyolite (P1)

3) Tight folding of volcanic rocks to form a dome structure that opens to the east and plunges steeply to the west at depth.

4) Fractures developed in Breccia during folding due to greater competency of this unit in comparison to the Porphyritic Rhyolite.

5) Sericite and Chlorite alteration takes place in Fractures areas.

6) Supphide minerals emplaced in fracture zones as they become dilatent due to relaxation of compressive forces.

7) Quartz Feldspar Porphyry stoped into the core of the anticline and off-shoot Rhyolite Dykes cut the ore. The thermal front associated with the intrusion of Quartz Feldspar Porphyry may have flushed the Sulphides ahead of it to some extent.

8) Diorite intrusion.

9) Diabase Dykes intruded, first N-S then E-W.

10) Displacement on Horne Creek fault continues possibly as a result of Grenville orogeny. This fault as well as lesser breaks were initiated as fractures in the axial plane region of folds. These fractures were zones of weakness along wich displacements took place when the stresses associated with the Grenville orogeny were applied.

Considerable time was spent in an effort to find exposures that would substantiate this sequence of events as it is fully realized that many workers in this area would not agree with the early emplacement of ore. The relationship of the Rhyolite Dykes and Quartz Feldspar Porphyry to one another and to ore is particularly difficult to establish. The Rhyolite Dykes were studied from 2820 to 3270 levels and it is concluded that the Dykes are post ore. However it should be noted that anomalous relations exist due to faulting and re-mobilazation of Sulphides after the intrusion of the Dykes. On the 3120 Level the Rhyolite Dykes can be traced eastward until they merge with the Quartz Feldspar Porphyry. Here and in drill core the two rock types become indistinguishable and I am forced to conclude that the Rhyolite Dykes are satellites of the main body of Quartz Feldspar Porphyry. The only place in the mine where a Rhyolite Dyke cuts Quartz Feldspar Porphyry is on the 23-300 Dr. N. and here I feel it is a case of a dog biting his own tail. From

these relationships it follows that the large mass of Quartz Feldspar Porphyry is post ore.

Figure 3 showing the structural contours of the footwall of the Porphyritic Rhyolite and its relation to ore points out clearly the controlling influence of the folded volcanic rocks. The localization of particular bodies with the fold must be attributed to fracture development. The orientation of fractures in turn would depend on rock competency and orientation of the applied stress. The zones of fracturing that are evident on Fig. 3 are these associated with the Southwest orezone, those that come around the northwest side of the anticline and give rise to the 21, 20, 19, 18 and Dyke Zone ore bodies, a Keel-Like fractures that allowed the ore to come into the East and West orebodies at the top of the dome structure.

Structural contours of the Quartz Feldspar Porphyry are shown on Fig. 4. If this figure is laid over Fig. 3 the control of the anticline on the shape of the intruded Quartz Feldspar Porphyry becomes evident. It will be noted that the ore is never closer to the body than 200 feet. Why this should be so may be coincidental or could represent a relationship that results from the heat of the intrusion flushing the ore outward and upward in the anticline. The westerly plunge of the anticline and the control it apparently exercised on the intrusion suggests that the Quartz Feldspar Porphyry may also have a westerly plunge. The geometry of the ore occurrences at Quemont and the Quartz Feldspar Porphyry body, suggests that the area adjacent to and above such bodies is a good place to look for ore.

Physical Age Determinations:

As the sequence of geological events is of prime importance in future exploration same absolute ages have been determined by the potassium-argon method. The location of samples, minerals analyzed, and calculated ages are given in the following table. All determinations were made at the University of Alberta.

Sample Location	Mineral	Age
Sample "A" Noranda 17th. Level on Contact of Lower H	Sericite	2480 million years
Sample "B" Noranda 20th. Level on Contact of Lower H	Sericite	2340 million years
Quemont 1620 level Footwall 20 Orebody	Sericite	2250 million years
Diorite (Metadiabase) #1 Shaft 900 Station	Hornblende	2440 million years
N-S Diabase 2160 Level Quemont	Hornblende	1740 million years

The interpretation of these results that I would make at this time is tentative as more dating is necessary to confirm my conclusions. Sample "B" from Noranda spluttered up in the tube during the outgassing so the result is suspect. Sample "A" was a perfect run so an age of 2480 million years is probably correct for the Noranda sericite. The Metadiabase age of 2440 million years is virtually the same as the Sericite. For this reason I feel the introduction of the large volume of this rock into the Noranda orezone outgassed the Sericite and in effect set the clock 2440 million years ago. Similarly the 2250 million year age for the Quemont Sericite represents a setting of the clock by the intrusion of Quartz Feldspar Porphyry in the mine

area and the Powell and Flavrian granites within the region. To confirm this a date on the Quartz Feldspar Porphyry is necessary and some difficulties are involved in an age determination on this type of rock. The 1740 million year age for the N-S Diabase, however, clearly indicates it is much later than the sericites and by implication later than the ore.

A tabulation of the events outlined above is as follows:

1)	Sericite and related Sulphides	2500 to 2700 million years
2)	Metadiabase at Noranda	2440 million years
3)	Quartz Feldspar Porphyry at Quemont	2250 million years
4)	N-S Diabase	1740 million years

Recommendations

At the end of the 1960 field season a short memorandum was written suggesting certain work that should be undertaken. The following is a brief tabulation of the progress made on the various projects.

A) Twelve rock samples representative of the principal types in the mine were chemically analyzed and petrographically described. The analyses were used to calculate the mineral compositions of the rocks. This work was completed in the winter of 1960-1961 and a report containing this information is on file with B. Taylor. As would be expected from the appearance of the rocks they are all quite similar chemically. The most significant variation is in the Chlorite and Sericite contents and this reflects proximity

to ore rather than an original difference. X-Ray fluorescence analysis indicates Zn. and Cu. are present in each of the 12 samples but no unusual element specific to any of the rock types was noted.

J.E. Riddell in an unpublished report for the Quebec Department of Mines presents 19 analysis of rocks from Quemont and shows in general there is an increase in Chlorite and Sericite as one approaches ore.

b) No work has been done on section 5200 E that increase our knowledge of the P1 contact in this plane.

c) Hole 44 B was drilled to the west at 45° and shows that the Joliet breccia does not dip appreciably eastward to a depth of 350'. A grid hole 45 B at 2300 N 800 E penetrated P1 to 2000' without encountering Breccia. This drilling by no means eliminates the recurrence of Breccia at depth in this region and this should be kept in mind if deep exploration is anticipated.

d) Holes at the 6000' horizon will be drilled from Noranda when sufficient air is available. These holes will attempt to outline the shape of the Quartz Feldspar body at depth.

e) Areas in the mine that might contain ore were outlined on 200 scale plans. This drilling ammounted to 20,000 feet and some 13,000 feet remains to be done from the 440 level down to the 3270 level.

In the drilling completed hole 251 D encountered 4 feet of mineralization running .18 Au, 2.78 Ag, 4.47 Cu and .06 Zn, north of the E-W Diabase on the 200' level. Hole 399 E returned 4.5 feet of material that assayed .30 Au, .26 Ag,

1.21 Cu, and 7.78 Zn, north of the E-W Diabase on the 320 level. The other holes failed to encounter any mineralization of note.

Study of the underground exposures and plans suggests two areas for exploration based on structural considerations. These are as follows:

a) Detail section 3500 E: This exploration is to check the possibility of the mineralization in drill hole 1653 (20 feet runs 1.53 Cu.) being related to the 18 zone and controlled by the same North-south break. I feel the 18 zone trend should be drilled from the stoped area through to the 2370 level.

b) Check for zones en echelon to 20 to 18 body trends: The fracture sets that controlled the mineralization from the 20 body around to 18 body are out in the Breccia (i.e.) south of the Porphyritic Rhyolite contact. This leaves sufficient ground for an en echelon fracture set to exist along the Porphyritic Rhyolite contact. Same mineralization does exist in this area as shown by exposures in 23-210 Dr. N. and in drill hole 2391. On the 2620 level drill hole 2612 returned 3.5' of 1.88 Cu in ore and 7' of 1.26 Cu. in the region under discussion. An adjacent hole 2616 shows intersections of 1' at 1.72 Cu and another of 2.5' with 1.56 Cu. Granted, these are not ore intersections but they do indicate this portion of the Porphyritic Rhyolite contact from 2340 level to the 2820 level merits detailed investigation.

With respect to exploration in this region I feel the zone of mineralization shown on section 1400 E should be defined between the 2340, 2520 and 2670 levels. Possibly the best approach to this exploration would be to extend 25-146 Dr. to the west.

c) The configuration of the Quartz Feldspar Porphyry is still the big question mark in determining the amount of favourable ground at depth within Quemont borders. The proposed holes from Noranda still appear to be the best approach to exploring the area but if the shortage of air at Noranda prolongs the wait for the holes I suggest the holes be drilled from the 3870 level at Quemont.

d) Exploration of North Zone of Non-Porphyritic Rhyolite:
The hatched area in figure 1 outlines the region of most favourable ground in the north zone of non-Porphyritic Rhyolite. Because of the nearly vertical attitude of the rocks it is felt that the best way to explore the zone through the tight fold is with long horizontal holes from underground. Specifically two holes are suggested from 5200 E and 4600 E from the 23-425 Dr. N. These holes would be drilled due north for about 2000' and would provide information that could be incorporated with the sections showing the grid holes at 4500 E and 5300 E.

Detailed exploration of the contact between the non-Porphyritic Rhyolite and the Porphyritic Rhyolite or Andesite is recommended. This contact is thought to be a favourable locus for fracturing and thus for mineralization.

The planning of this drilling in detail should wait until the present grid program in completed and the long holes have been drilled from the 2340 level so that all the information on the strike and dips of the contacts will be available. Because the non-Porphyritic Rhyolites are the most favourable host rocks consideration should be given to drilling from them into the Porphyritic Rhyolite or Andesite wherever possible.

A mineralized zone trending northwest in the vicinity of station "L" should be drilled to establish if an values are present. Several short holes dipping at 45 would serve to indicate the merit of further drilling. The long hole to the north on section 4600 E will pass under this zone and should be closely watched to see if this structure goes down.

August 23, 1961.

FAC/hb.

. . . . . .

F. A. Campbell.