PRELIMINARY REPORT

on

SOME TIN ORE-BODIES OF NORTH EASTERN DISTRICT.

It is understood that the principal object of this brief report is to supply information as to the extent of the deposits of tin-bearing granitic rocks and also as to their average value in each area. It may be stated here that these tin fields in the past have not received their due attention. Owing to the rapid depletion of some important alluvial deposits and the increase in the market price of tin more attention has been given to lode deposits during the past three years than formerly, and in consequence of this interest the geological survey has been investigating the most extensive of the deposits.

Complete surveys have been made of the Avoca and Blue Tier areas and others have been surveyed in part. A bulletin on the results of the recent investigation of the Blue Tier area is now in course of preparation, but this works cannot be published until the certificates of analyses of the drill cores have been received from the laboratories. However, the available information is given herein may prove of interest.

Before dealing with the economic side of the investigation attention is invited to the following brief description of the geology of Blue Tier range.

Geologic Relations

The mountain mass of Blue Tier is composed almost wholly of granitic rocks of Devonian Age. They are instrusive into Cambro-Ordovician slates, sandstones, tuffs, and volcanic breccias, and are in places (Mt. Littlechild for instance) overlain with conglomerates and sandstones of Permo-Carboniferous age and with basaltic lava. Narrow dykes of diabase (Upper Mesozoic) and basalt (mid-Tertiary) cut and traverse the granites and sedimentary formations.

Although the granites are responsible for the metamorphosis and mineralisation of the invaded rocks, the most extensive and the most important deposits of tin ore are found in apophyses of the main granitic body. It is these that form the chief subject of report.

The normal granite of which the Tier is composed in part is the fundamental rock of the North-eastern tin district. It is of coarse grain size, and consists essentially of quartz, felspars (orthoclase and oligoclase), biotite and a little muscovite. This rock has suffered the effects of weathering in a varying degree, and where traversed by veins of greisen has been transformed into a hard quartzose rock. Intrusive, apparently into that is a hard, fresh coarse-grained porphyritic granite with large crystals of felspar (one to three inches in length and grey, white, salmon or pink in colour) scattered through it in such a manner that a definite directional arrangement of the crystal axes is observable. In this porphyritic rock are many of the quartz and mica veins of greisen, all of which are more or less carriers of tin ore. The next to be described are the richest of the tin-bearing granites. This is not coarse in texture nor are they porphyritic; the mineral components (quartz, felspars, biotite, and muscovite) are similar, but are of fine to medium texture and equi-dimensional; and the general appearance of

the rock is quite distinctive. Aplite variants consisting essentially sometimes of quartz, and muscovite sometimes of orthoclase and quartz, or almost wholly of orthoclase, and having definite dyke-like forms, are of particular interest because these are the most extensive and therefore the most important deposits of tin-bearing stone. They are the "acid extracts" of the granitic magma.

Notable features of the large bodies of the medium grained granites are their close and almost horizontal jointing. These comparatively small bodies cooled slowly in their warm containers in layers of varying thickness, and the divisions thus formed between layers providing lateral means of access gave rise to the extensive floor-like deposits of tin ore. Such deposits are those of Mt. Michael, Australia, Don, Crystal Hill, Liberator, and Blue Tier Mines.

All the largest deposits of tin-bearing stone throughout north-eastern Division are found in those fine-grained granites and their associated aplites in the manner described.

The Nature and Extent of the Ore-Bodies

The fine to medium-grained granites of almost horizontal jointing are traversed with veins of greisen usually in an east of north direction and dipping at high angles. The greisen veins consist of quartz-mica, or largely of quartz, or of dark green mica, and are invariably carriers of tin ore, and also in place a little molybdenite, chalcopyrite, bismuthernite, wolfram, galena, scheelite and pyrite mineralising. solutions from these highly inclined fissures spread out along the horizontal joint planes and formed the "floor" deposits. There is ample evidence to show that mineralisation took place while the rock was in a condition of flux, and probably the mineralisers contributed to that condition. Where mineralisation is greatest the mineral pinite is a prominent component of the rock. In places the tin-bearing rock consists of quartz-pinite, or of quartz-pinite-muscovite, or again of quartz-pinite-felspar. The presence of pinite and felspar in association shows that the former is not a derivative of the latter but the unformed mica component. In this rock cassiterite was an original component and was not introduced at a later stage in the forms of veinlets or blebs. It is fairly evenly distributed through the body of the rock the particles in dimensions equal to those of the interstitial component minerals. The presence of pinite is indicative of the near presence of tin ore.

In Blue Tier area these bodies extend westward from the Blue Tier mine (late Anchor) through the Crystal Hill to the Liberator, a distance of 1½ miles. The Don body to the north may be the extension in that direction, but this has not been proved. Half a mile further northward are the Australia and Hodgman & Bryce's Mines which are unconnected with the Southern Group, but these are connected with the Ethel, Planet, Southern-Cross and Mt. Marie line extending unbroken a distance of two miles. Outlies of the last body are the Moon and Mt. Michael deposits on the East and an undeveloped deposit on the West discovered during this investigation. As regards the width of tin bearing stone in the dyke-like formations it is

difficult of determination on the basis of the work performed by the several operators. However it is known that the average width of payable ore is not more than 20 feet and that the average value is not in excess of 0.25 per cent.

At the Moon the deposit is circular in outline and about 200 feet in diameter. It has been proved to a depth of 40 feet, and the stone is above the average value some of it - the quartz-greisen portion - being of one percent grade. In the early days of the field a large quantity of tin ore was produced from this mine in addition to others a shipment of 50 tons is on record.

The Mt. Michael Co. is quarrying and milling ore from their rock deposits at the Northern end of the field. A ten-head stumper battery and two concentrating tables deal with 60 tons of stones each day. The richest of the stone (o.38 per cent tin recovery value) only is treated. This work can be regarded as a sampling of the richer ore at that place, but the ore in bulk is not likely to exceed 0.25 per cent grade. A cut has been opened 300 feet in diameter to a depth of 20 feet.

The Mt. Marie deposits have been explored in deep trenches (about 70 feet apart) and shallow pits a distance of 2500 feet along the course of the ore-body. The drilling and sampling of the stone are now in hand. On the basis of the sampling already performed the grade of the stone is not expected to exceed 0.20 per cent tin.

In the Southern Cross leases, south and adjoining Mt. Marie the tin-bearing stone consists largely of aplite but the dyke there is much narrower. It has been traced through the Planet and the Ethel blocks to Brye & Hodgmen's where the greater part of the ore is found in "floors" about 40 feet thick and over 400 feet in extent. An open-cut exposes the body here 30 feet in depth and 100 feet in length.

Further south and 200 feet lower is a large opening into another body of tin stone. Here an open-cut 30 feet deep and 400 feet long reveals various types of greisen and some richer north of east trending bodies consisting almost wholly of felspar and quartz.

Don mine lies at the foot of Australia Hill. The orebodies here are of the "floor" type and have been opened in cuts and the richest section of one of the "floor" deposits has been opened on the panelling system of mining. The body here is exposed in cuts 500 feet in length and 30 feet in depth. Crystal Hill, Duce and Liberator Mines are openings in apparent extensions of the Blue (late Anchor) body. At times in its history each was furnished with milling and dressing plants, but so small as to be quite inadequate.

The Blue Tier or Anchor Mine has been the most important. From this body 1,401,600 tons of stone was removed, crushed, and treated for 2,912 tons of tin ore, averaging a little ofer 70 per cent tin.

Other Deposits in Neighbouring Areas

The Tin Pot - Central Cascade line of lode, the Cream Creek bodies, the Mt. Paris contract deposits, the Mt. Rattler - Mammoth greisen, and the Weldborough greisen deposits are of similar character in parts all are of low grade, and are extensive.

The richest of the known large ore-bodies is that of the St. Paul Mine (formerly Royal George) near Avoca. A special report of this is attached.

Practical Consideration.

The rock containing the tin ore is granular and generally soft, in places very soft. Some of the ore-bodies however contain quartz-greisen, a very hard brittle rock; but the proportion of that to the whole is very small. The milling of the rock is therefore neither difficult nor costly.

Impurities are noticeable only in pegmatite veins and quartz-greisen. These impurities are molybdenite, wolfram, chalcopyrite, scheelite, galena, and bismuthenite, with also pleonaste and zircon. The proportion of these individually or even collectively is so small as to be be negligible. This is apparent from examinations of assay certificates of the concentrate.

The tin ore is found as a rule in crystal aggregates, some of it recoverable in jigs, the greater part on tables of the wilfley type, and the comparatively small amount of slime tin ore on slime tables or vanners. As regards the saving of the slimed tin ore portion it is advisable to first separate and remove as much as possible of the clayey matter (Kaolin or decomposed felspar) in settlers before passing the pulp to the vanners.

As regards mining and open-cutting the conditions generally are favourable. All deposits can be open-cut to a depth of 100 feet before reaching drainage level, and some may be attacked to great depths (400 to 500 feet) by means of adits.

No difficulty need be anticipated in the provision of adequate supplies of water for milling and concentrating purposes.

Well constructed roads connect all the mines to government railways; and facilities are provided for daily communication.

General Remarks

The very large tin-bearing bodies of granitic rock have been opened at many points, and in the aggregate a large amount of rock has been mined, milled and treated. Such works may be regarded as a fair sampling of the richer sections at those points of attack. A greater amount of drilling is desirable to determine the extensions of the deposits along the strikes and dips and to ascertain the average value. Further drilling of some of the deposits is to be undertaken by the Department early in January of next year.

These deposits are regarded as great potential reserves and the mines will sooner or later take the place as important producers of tin ore of the alluvial mines, many of which are nearing the end of their reserves.

Mines Dept, signed A.McIntosh Reid DIRECTOR OF MINES
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