TR2-106-109

McCORMICK—MILLER NICKEL PROSPECT

by TERENCE D. HUGHES

This prospect, formerly known as the Lord Brassey Mine is situated about a mile to the north-east of the bridge by which the Waratah-Corinna Road crosses the Heazlewood River, 16 miles from Waratah. A bulldozed track has recently been put in from a few chains west of the bridge, crossing Roaring Meg Creek and ascending the steep slope to the mine. Down this track by means of horse sledge, the syndicate has brought several bags of nickeliferous material from the old dump.

Bare hills, typical of serpentinite country form the divide in this locality between the Heazlewood River to the east and Savage River to the west. Near the top of one of these hills and 500 to 600 feet above the Heazlewood River are the old workings of the Lord Brassey Mine and its southern neighbour, Jupps Nickel. Both these prospects, they were little more, are well described by W. H. Twelvetrees in his 1900 " Report on the Mineral Fields between Waratah-Corinna ".

A large complex of Cambrian-Basic-Ultra-Basic rocks occurs between the Precambrian rocks of Long Plains and their northern extension and the Cambrian sediments in the Cleveland-Whyte River District. Large areas of the gabbros, peridotites and pyroxenites have been serpentised and in the vicinity of the Heazlewood Bridge is a north-south trending body of serpentinite some two miles long by half a mile wide. Regional geological mapping is shown in Bulletin 33, " The Silver-Lead Deposits of the Waratah District " by P. B. Nye in 1923.

In the region of the workings, the rock is wholly serpentinite although it does contain varieties that differ widely from the norm. A heap of rock stacked at the entrance to a crosscut consists of a pale, fine grained greenish-grey rock. It has been described by G. Everard:—" In thin section, it shows a structureless aggregate of fine laths and plates of a colourless pyroxene, granular colourless garnet and interstitial serpentine. It may represent a fine grained marginal phase of a basic rock which has been garnetised and serpentinised."

Near the face in the main drive is a band of whitish rock which is very similar to the rodingite from Beaconsfield described by the C.S.I.R.O. earlier this year. (Mineragraphic Investigations No. 682). Everard states that the specimen from the Lord Brassey Mine is somewhat less altered and more easily identifiable as a garnetised gabbro.

The serpentinization of these basic rocks probably occurred during a late magmatic phase and was accomplished by water from the magma as well as possibly some from the intruded sediments. A great increase in volume resulting from this hydration caused much internal shearing and slickensiding in the serpentinite bodies, giving an erroneous impression of strong faulting.

Also probably contemporaneous with the injection and serpentization of this basic material was the segregation from the magma of nickel and iron minerals. The emplacement of these occurred in the shear zones, cracks and joints formed during the serpentization of the rocks. Thus we cannot look for recognizable structural features formed by later faulting and folding to influence ore deposition but must regard this nickel deposit as a kind of stockwork of veins, segregations and even impregnations of nickel sulphide and magnetite within the serpentinite mass. The only recognizable pattern is in the form of a series of shears in which the serpentinite has been crushed to a substance, black and almost slatelike in appearance. These shears strike south-west and dip to the north-east at about 80°. Mine development has followed at least three of these shear planes.

The nickel mineralization is extremely interesting. The primary mineral is a sulphide which in 1896 was named by Petterd, " Heazlewoodite ". In his 1899 appendix to the System of Mineralogy, Dana described it as follows:—" A sulphide of nickel and iron related to pentlandite, occurring in narrow bands in the serpentine of Heazlewood, Tasmania. Colour, light yellow bronze; streak, light bronze. Highly magnetic. $H = 5$, $G = 4{\cdot}61$ ".

In later editions, Dana dropped all references to " Heazlewoodite " but in 1947 Peacock (University of Toronto Studies, Geol. Ser. 51) established the validity of the mineral species by a full mineragraphic and X-ray study of material from the type locality and showed that the supposed highly magnetic nature of heazlewoodite, Ni_3S_2, was due to intergrown magnetite. Lately, August, 1957, in Mineragraphic Investigations No. 711 of the C.S.I.R.O., Edwards has described heazlewoodite and its oxidation product, zaratite ($NiCO_3$ $2Ni(OH)_2$ $4H_2O$):—

" Polished sections prepared from the present sample indicate that it is similar in most respects to the specimen described by Peacock. The veins consist principally of heazlewoodite, invariably intergrown with a substantial proportion of magnetite and some gangue. The heazlewoodite has a granular texture with individual grains seldom exceeding 0·8 mm. in diameter. The magnetite commonly fills the boundaries between these grains, so that the resultant texture is strongly reminiscent of the 'rim' or 'net' texture derived by segregation of one component from solid solution within another. Magnetite has also penetrated heazlewoodite along directions corresponding to its rhombohedral cleavage directions. The width of the magnetite zones varies considerably, but is generally between 0·05 and 0·2 mm. Little or no magnetite occurs in the serpentine except in this close association with heazlewoodite patches."

He also describes small inclusions of pentlandite in the heazlewoodite as well as tiny " flames " of millerite, thought to be secondary.

Heazlewoodite near the surface oxidises to a bright emerald-green mineral, zaratite, which is an hydrated nickel carbonate.

It should be pointed out that specimens of such a rare mineral, heazlewoodite and to a lesser degree, zaratite may find a ready sale with collectors, and agents, particularly in U.S.A., should be approached with this in view.

The workings consist of about 1000 feet of driving most of which is still accessible. The direction of the adit is to the south-east and at 119 and 341 feet crosscuts open to the south, but both of these soon swing round and follow soft ground in the shears to the south-west. The adit continues to 650 feet, the last 240 feet being along a third shear, and the maximum amount of backs is about 100 feet. If the adit were continued another hundred or so feet it would come out again on the eastern side of the hill.

In the workings, the green carbonate, which is readily detectable, is very common particularly along the main adit from 400 to 600 feet. The carbonate, of course, is not primary but is formed by the oxidation of the sulphide and occurs only near the surface. Some of this oxidation is probably post-mining. The main shear planes have formed channel-ways for the ground water and the carbonate has been deposited principally along these. It would appear that the deposition took place along the centre of the shear plane along which mining development proceeded. In the second crosscut a sample from a heap of softish black sheared serpentinite, showing plentiful green zaratite assayed 3·8% nickel. This was presumably mined from the centre of this crosscut, for a sample taken along the wall for 40 feet showed but 0·16% nickel.

The heazlewoodite itself is not easily seen underground. It is pale in colour and quickly tarnishes; so that if it is sought along the wall of the adit, the rock must be broken. Many rich samples can be seen on the dump. At one point near the second crosscut, the syndicate is putting in a small opening in the northern wall and much sulphide can be seen here.

Because of the original nature of the mineralization and irregular joints and shears caused by serpentinization of the basic material, it is not thought that any regular plan of underground development can be formulated but rather that the whole hill be regarded as an open-cut proposition. Whether sufficient nickel exists in economic quantities (say of the order of 1%) is doubtful but there are many favourable factors associated with this prospect, viz.:—

1. Sufficient underground development has taken place to open a reasonable area for sampling and the first step should be the taking of a series of chip samples along the walls of all the underground openings.

2. The form of the nickel mineralization. Heazlewoodite Ni_3S_2 contains more nickel (73·3%) than pentlandite 2Fes NiS (22%) or millerite NiS (64·7%). The presence of the intimately associated magnetite may make separation by magnetic means a useful method.

3. The local topography makes the situation ideal for an open cut, the whole top of the hill could be sliced off. It should be noted that good specimens of nickel minerals were found on the dump of an old shaft near the top of the hill.