SUMMARY REPORT ON THE COPPER-NICKEL DEPOSITS OF THE FIVE MILE DISTRICT, ZEEHAN

Location and Access

The copper-nickel field is situated in the Five Mile district 5 miles to the north east of Zeehan.

Access is gained by road and the Emu Bay Railway from Zeehan. Formerly a tramway traversed the field and short branches from it served the individual mines.

Published Literature

(1) Geological Survey of Tasmania, Bulletin No.36 The Dundas Mineral Field, 1925. A.McIntosh Reid. Page 23.

(2) Principals and Practice of Geophysical Prospecting. Report of the Imperial Geophysical Experimental Survey 1931. A.B.Broughton Edge and T.H.Laby Page 84.

(3) Report of the Secretary for Mines, Tasmania, 1930. Page 21.

Geology

The copper-nickel field embraces a low-lying swamp region now mainly covered by low scrub. Outcrops are few but the prospecting and mining operations have made available sufficient sections to enable the geological structure to be determined.

The Dundas group of slates, breccias, etc. of Cambrian age occupy the greater part of the field. The slates are the most common and the typical purple, grey and green types are present. These rocks are intruded by at least two dykes of basic to ultrabasic types. These dykes have a general width of 50 feet and are about 5 chains apart. Their strike is 353 and the dips appear to be easterly.

In the swampy places, the peat, soil, etc. covers and obscures the bedrock.

Economic Geology

The copper-nickel deposits are associated with the eastern dyke. The lodes are either in or at the western or footwall side of the dyke. They conform to the dyke in strike and dip except in so far as they might pass from the centre to the footwall of the dyke.

The eastern dyke is at least 1½ miles in length and the copper-nickel deposits occur along a length of 1¾ miles. The deposits are not continuous but occur as a number of separate ore-bodies along the above length.

The ore is a massive sulphide one containing pyrrhotite, pyrite, chalcopyrite, pentlandite, and marcasite. The chalcopyrite in the mineral which contributes the copper content to the ore. The pentlandite (sulphide of iron and nickel) supplies the nickel content, but is not readily distinguished by eye

owing to its similarity to the pyrrhotite. The pyrrhotite, pyrite, and marcasite contain no valuable metallic contents, although the first named may contain small amounts of nickel and copper due probably to inclusions of pentlandite and chalcopyrite.

The ore has been oxidised at the surface to limonite with secondary copper and nickel minerals. At a depth of 100 feet in the workings it is stated that the ore has been replaced by cellular quartz. The average metal content appears to be copper 5% - 6% and nickel 9% - 12%.

The ore-bodies

The various ore-bodies will be briefly described starting from the south end and describing them in order.

Devereaux Ore-Body (Abandoned Section 8851/M, 10 acres)

This ore-body represents a parallel line to the remainder which will be described below. Shallow shafts have exposed copper-nickel ore and a trench excavated in 1933 is stated to have exposed ore at the approach and at the shaft with which it connects. Tothe north of the shaft the ore-body does not appear in the usual position on the western side of the ultrabasic dyke. In this ore-body, the composition of the ore differs from the others in that the copper content (13 to 18 per cent) exceeds the nickel content (5 to 9 per cent.)

The width at surface is stated to be 12 to 18 inches but the length has not been determined. The ore is reported to contain 1.1 to 1.4 ozs. silver, 0.02 to 0.04 oz. gold and 0.10 to 0.16 oz. platinum per ton.

Nickel Reward Ore-Body (Lease 4M/46, 20 acres, Montana Silver Lead N.L.)

Copper-nickel ore was mined at this locality during or prior to 1894. It is reported that the ore body was 30 feet long and 2 to 8 feet wide. Two bore-holes were put down in 1914 but did not intersect any ore. In sinking a new shaft in 1933, ore was discovered on one side of it.

From the surface it is difficult to determine the position and strike of the ore body.

The ore sold is reported to have contained 8 to 12% nickel 3 to 5% copper.

Melbourne Copper-Nickel South or Vaudeau Ore Body (Application 2M/51, 34 acres, R.E.Clarke)

This ore body was worked in the Vaudeau or south shaft of the Melbourne Copper-Nickel Co. during 1913 and 1914. A shaft was sunk to 127 feet and levels opened out at 70 feet and 122 feet. The 70 feet level was driven on 27 feet north and 52 feet south. At the 122 ft. level, the crosscut and north drive did not cut ore, but a lode of vughy quartz. In the south

drive ore was cut at 11 ft. and was followed for 30 feet, being 3 foot wide.

It has been estimated that 1500 tons of ore exist above the 122 ft. level and apparently the ore body extends below the south drive. The Melbourne Copper-Nickel Co. in 15 months produced 2776 tons of ore and, in addition to refunding the capital expenditure, provided £9600 in dividends. Prior to the company's operations 73 tons were mined from near the surface.

Five boreholes were put down in 1914. No. 1. cut the ore body at 50 feet and proved 10 ft. of ore. No. 2 cut it at 100 ft. and proved 1 ft. of ore while No. 3 did not reveal any ore at 200 ft. in depth. It is stated that Nos. 4 and 5 bores were put down north and south of No. 1 and variously stated that they did and did not reveal any ore. Where ore was proved by these bores it has been worked out. As the ore body apparently pitches south No. 3 hole might have missed the ore owing to not being suitable sited.

Three bore-holes Nos. 11, 15 and 17 were drilled by the Department of Mines for Gold Mines of Australia Ltd. in 1939-40 to test the possible extensions of Vaudeau ore body at depth. No ore was disclosed in any of these holes but between 223½ ft. and 224½ ft. in No. 11 bore the dyke rock carried a small amount of greenish material but no sulphides. Assay results of 2 inches of core gave nickel 0.1% and a trace of copper.

Blowfly and Mosquito or Melbourne Copper Nickel North Ore-Bodies.

Application 2M/51, 34 acres, R.E.Clarke).

These were worked from the Blowfly and the Mosquito shafts. Two bores (1914) were put down to cupt two shoots of ore shown at the surface at a depth of 50 feet but failed to prove ore. Later 52 tons were mined from Mosquito shoot and 250 tons from Blowfly shoot. The shoots were apparently short and lenticular.

In the 1939 - 40 drilling campaign, bores Nos. 12 and 14 were drilled to explore the Mosquito shoot and bores Nos. 13 and 16 the Blowfly shoot. Although dyke rock was passed through at various depths, ore was not located.

Dundas Cuni South Ore-Bodies (Application 11M/52, 30 acres, Montana Silver Lead N.L.)

(1) Eastern ore body. This ore body was worked in the Dundas Cuni South shaft. A level was opened at 75 feet and the ore body proved to be 90 feet long and to have a southerly pitch. Some 1189 tons were mined, the dipments assaying 5 to 5.5% copper and 10.3 to 11.57 nickel. Work stopped owing to the absence of markets following the outbreak of war in 1914.

In 1930, the Mines Department put down three bore holes to test the extension of this ore body. No. 1 was 1000 feet south of the shaft, No. 7 was 100 feet south of No. 1 and No. 8 was 100 feet north of the shaft. None

of the bore holes intersected ore, proving that the ore body cannot be much longer than the 90 feet proved in the workings. The extension in depth was not tested.

The geophysical survey (I.G.E.S. in 1928) proved a minor conductive zone 150 feet in length coincident with the above ore body.

(2) Western ore-body. The Geophysical Survey obtained a minor conductive zone about 100 feet west of the eastern ore body.

Two trenches were sunk to expose this ore body. The trench between Beacons Nos 1 and 2 proved a two-foot formation containing 1 inch of pyrite while that at Beacon No. 2 proved a four-foot formation of oxidised material with a good footwall dipping east.

Dundas Cuni North Ore-Body (or Copper-Nickel South Ore Body)
(Lease 2M/47, 157 acres, Montana Silver Lead N.L.)

This ore body occurs in the workings from the old Dundas Cuni North Shaft aferwards (1928) re-opened by the Copper-Nickel Mining Co.

The geophysical survey suggeste that this has a possible maximum length of 300 feet with a greater concentration over 200 feet. The outcrops and exposures in trenches suggest a length at the surface of 130 feet mainly to the south of the shaft. Gossanous material occurs at intervals along a length of 150 feet to the north of the shaft while boulders of sulphide in clay occur a further 100 feet to the north.

In the shaft workings the lode was 2 feet wide being vertical near the surface and dipping east at 40° at a depth of 40 feet. It was driven on at the 70 ft. level and stoped out for 30 feet above the level over a length of 80 feet. The general strike is north and south. In 1929, this company extracted 842 tons which contained 85.44 tons of nickel and 46 tons of copper. In 1930 the ore mined contained 117.6 tons of nickel. The workings were carried out from the old shaft.

Copper-Nickel North Ore-Body (Lease 2M/46, 157 acres, Montana Silver Lead N.L.)

This ore body was originally cut in a trench where it was stated to be small and of low grade.

The geophysical survey obtained indications by several methods. Three trenches dug proved the presence of gossan and sulphide ore.

The ore body has a general stike of 40° to 50°. At the south western end lode capping outcrops and has been exposed over a length of 100 feet. To the northwest, gossanous capping and some sulphide ore were exposed in trenches at Beacons 4 and 5. At the surface therefore the lode has a possible length of 350 feet.

In order to test the lodes at depth, three diamond drill holes were put down in 1930. No. 3 hole (No. 1 IGES) was designed to cut the lode below No. 5 Beacon. It was started at a point 75 feet southeast of the outcrop and put down in a northwest direction at an inclination of 45°. Though drilled to a depth of 110 feet, no ore was intersected. No. 2 hole was sited similarly with regard to No. 4 Beacon. At 72 feet a lode 3 feet wide was intersected and consisted of soft sulphide ore which yielded little core. The available core assayed 6.01% nickel and 2.6% copper. A third hole, No. 4 (No. 2 IGES) was put down between Nos. 1 but further away so as to cut the lode at a vertical depth of 100 ft. At 140 feet, 3 feet of solid sulphide ore was intersected which on assay (average of three samples) gave a result of 10.0% nickel and 5.5% copper.

Copper Nickel Mining Company sank Genet's Winze near the southwestern end and stoped ore to a depth of 10 feet over a length of 70 feet.

Further drilling for Gold Mines of Australia Ltd. in 1939-40 failed to intersect ore. No. 9 bore was sited to test the downward extension of the ore body disclosed in No. 2 bore (1930). The drill passes through the pyroxenite dyke at between 142 feet and 168 feet and disclosed a very slight pyritisation for a few feet on the footwall side of the dyke. A section at this bore shows the dip of the dyke to have flattened to about 20°. The bore was extended beyond the dyke footwall to the objective length of 346 feet as this was the first attempt to test the deposit in depth since there was a possibility that the ore previously discovered was in a dyke parallel to the one intersected by this bore. No. 10 bore was sunk to 180 feet. It passed through the dyke between 155 feet and 163 feet showing specks of pyrite in the last 2 inches.

SUMMARY OF INFORMATION ON ORE-BODIES

	Length Feet	Width Feet	Depth Feet	
Devereaux		1 - 1.5		
Nickel Reward	30	2 - 8		
Vaudeau	79' at 70' level 30' at 122	0 - 10 3' at 122 level	122	Worked down to 122' level with 1500 tons left above this level
Mosquito	47'	?	Small	Worked down to 10'
Blowfly	60'	?	Small	Worked down to 14'
Dundas Cuni South(Eastern)	90'	?	75'	Worked down to 75' level

(continued)

	Length Feet	Width Feet	Depth Feet	
Dundas Cuni South(Western)	Possible maximum 150'	2 - 4	Not Known	Indicated by Geophysical survey outcrop proved by two trenches. Nickel and copper contents not known.
Dundas Cuni North or Copper Nickel South	80' at 70' level Possible maximum 200'-300'	2'	70'	Zone 300' long indicated by Geophysical survey with concentration over 200'. Partly worked out above 70'.
Copper Nickel North	Possible maximum 350'	3'	110'	Indicated by Geophysical Survey. Several trenches and 2 bores have proved ore body. Worked down to 10' at Genet's Winze.

Reserves

It will be realised from the above that though there are nine ore bodies along a length of 1¾ miles, each ore body is comparatively short and narrow and has only been proved to shallow depths.

The Dundas Cuni North and the Copper Nickel North ore bodies appear to represent the longest and any mine should be started on these bodies. It is possible that a maximum of 15,000 tons of ore could be considered to exist in the field made up chiefly from the above two ore bodies. Small reserves would exist below the bottom levels in the Vaudeau and Dundas Cuni South ore bodies and also from the Devereaux Mosquito and Blowfly, and Nickel Reward ore bodies.

It is possible that other ore bodies exist along the length of the dyke. However, prospecting is difficult and the Geophysical Survey did not reveal any other indications as far south as the Vaudeau ore body.

Prospecting, Development and Mining

The copper nickel lodes occur in a flat region, the greater part of which is swampy, while the whole is covered with scrub. Prospecting by trenches is difficult in the swampy places on account of the depth of soil, etc. and the large amount of water, but in the dry places trenching can be carried out to a certain extent. Shallow shafts involve pumping and render prospecting difficult in this respect also.

As the lodes are of dense sulphides and occur under known geological conditions, viz. in a narrow basic dyke intruding slates, etc. boring is the best means of proving them.

When working shafts are sunk, large quantities of water are met with and require comparatively large pumping plants.

As the ore bodies are generally widely separated, a number of mine openings would be required.

Sgd. F. Blake.

The Department of Mines,
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10.4.52.