

R E P O R T
on the
COPPER-NICKEL AREA OF NORTH DUNDAS

INTRODUCTION

In 1914 before the outbreak of the Great War two copper-nickel mines in this field were in active operation. The closing of the market following this event caused the cessation of production, and, in one case, the abandonment of a very profitable enterprise. Prior to the war a market for this class of ore was found in Germany, and regular shipments were maintained to that Country. Although similar ores were being mined and smelted in America that market was not available to local producers.

With the return to normal conditions of trading with Germany an effort is being made to re-open this market, and it is hoped that, as a result of negotiations at present in hand, operations will be resumed early in the new year. Before re-opening the mines it is proposed by the owners to ascertain the extent of the known shoots of ore and to test the intervening country where other ore-shoots are likely to be found. In the performance of this work a diamond drill is to be used. Desiring advice on this policy the operators approached the Government with the object of obtaining an official report. In compliance with their request the writer was instructed to inspect the site of the proposed works, examine the ore-deposits and report on the results of his investigations.

In the performance of this work only five days were spent on the field. The investigation was, in consequence, incomplete, but it is considered that the information obtained is quite sufficient to enable the writer to report definitely as to the future prospects of the field and the best methods of testing and exploiting the ore-bodies.

LOCATION AND EXTENT

The North Dundas Copper-Nickel field lies midway between Zeehan and Renison Bell which are 10 miles apart. Zeehan is an important silver-lead mining centre and Renison Bell is the centre of a tin-producing area. As its title implies this nickel field is situated in the northern part of the district of Dundas and is four miles from the township of that name. From the foregoing it will be observed that the nickel mining area is surrounded by well-organised mining settlements.

The country that is proved to be nickel-bearing is six miles long and half a mile wide, or three square miles in extent. Up to the present development work has been confined to a narrow belt about a mile long, but surface exploration has resulted in the discovery of nickel ore extending from Leslie Junction on the Dundas railway to a point west of the Emu Bay railway tunnel, a distance of six miles by air line.

ACCESS

The field is easily accessible from Zeehan by railway and road. Zeehan is united to Strahan by a standard gauge Government railway, and to Burnie by a line owned by the Emu Bay Railway Company. The seaport of Strahan is 33 miles distant; and Burnie, the more favoured port for shipping, is 83 miles from the field. The Burnie railway passes through the centre of the area, and the North-east Dundas two-foot gauge tramway from Zeehan to Williamsford crosses the Burnie line at this point. Branch lines connect the important mine openings with the Government tramway. Thus every facility is provided for the cheap and rapid transport of the ore from the mines to the shipping ports.

PHYSIOGRAPHY

The development of the physiographic features of this area has been governed largely by the variation in the nature and character of the rocks that occupy and surround it. Thus, the rugged hills that enclose this basin-shaped area, built of erosion-resisting igneous rocks and hard metamorphosed sandstones and slates, stand out in relief from the flat, swampy base occupied by soft sediments, the tuffs and slates of the Dundas series. This swampy basin, five miles in diameter, is drained by tributaries of Little Henty River which find an outlet to the south-west through a gap in the enclosing hills.

The lines of mineral deposition pass through the centre of the swamp-lands from north to south. As yet the nickel ore has not been traced into the hills, consequently all mining operations have to be performed through shaft opening. Occurring in such swampy country the problem of draining the mines on these lodes is one of very great concern to the operators. In other respects the conditions are favourable for cheap mining and transport, and these advantages outweigh the disadvantage alluded to.

OUTLINE OF THE GEOLOGY OF THE FIELD

The sedimentary rocks and the associated tuffs belong to the Dundas series of the Cambro-Ordovician. In every respect they are similar to the rocks of this age occurring at Renison Bell and Waratah. They consist of:-

grey and black slates;
grey quartz-felspar tuffs;
red slates and red tuffs.

These rocks occur in intercalated beds of varying thickness, and have a north-west trend and easterly dip. Probably the red slates are pyroclastic.

At the close of the Silurian these sediments and tuffs were intruded by dykes of basic rocks of various kinds, but all were derived from one stock magma having been separated by processes of differentiation. Directly following the intrusion of the main body of the basic irruptive numerous narrow subsidiary dykes of gabbro, norite and pyroxenite broke through the sediments and tuffs, completely fissuring them. Several of these narrow dykes are known, and probably many more traverse the swamp-lands

but are covered with peat and soil. Along the course of these subsidiary dykes the copper-nickel ore-bodies are found, and parallel offset lodes of silver-lead ore occur in the slates and tuffs on either side of them.

THE NICKEL ORES AND THEIR ASSOCIATES

This ore is generally described as a nickeliferous pyrrhotite or as copper-nickel sulphide. It is essentially a mixture of pyrrhotite, pentlandite and chalcopyrite in that order of quantitative importance. In addition to these many accessory metallic minerals such as pyrite, marcasite, galena and sphalerite occur in the lodes, and the less common nickel minerals millerite, niccolite and zaratite are occasionally found. The pyrrhotite, pentlandite and chalcopyrite components occur in the form of small crystalline grains in intimate association and are of contemporaneous origin. Whether the pyrrhotite is nickel-bearing in itself or whether its nickel content is due to disseminated pentlandite has not yet been determined, but pentlandite has been detected in the ore apart from pyrrhotite. These minerals of similar appearance are difficult to distinguish by eye when they are so closely associated and in such a fine state of division. Although arsenide of nickel is reported the sulphide combination is the general rule.

The ore is dense and massive and is, usually, free from gangue minerals. It oxidises readily when exposed to the elements tarnishing to a dun brown, and in large heaps the conversion to sulphates of copper and nickel is very rapid. The heat generated in this chemical reaction is sufficient to induce spontaneous combustion, and fires are not infrequent in large accumulations of broken ore. Advantage is taken of this property in the process of heap-roasting. It weathers in globular and ovate forms, the exposed material gradually breaking away in thin, rounded scales.

As a rule the copper constituent of the ore is about half that of nickel, but at the Devereaux prospect the proportion is three parts of copper to one of nickel, the variation being due to the relative amounts of chalcopyrite and pentlandite in the ore.

THE ORIGIN OF THE ORE-BODIES

At the time of the investigation all the mines were closed and the shafts were full of water, and, therefore, no opportunity was presented of examining the lodes at depth. Very few outcrops project through the peat covering of the swamp-lands and where the ore-bodies are exposed the minerals composing them are more or less oxidised thereby restricting the investigation of the relationship existing between the ore and the associated igneous rocks. In the time allotted for this work it was impossible to extend the field of study to the main body of the intrusive.

On the meagre evidence at hand an authoritative discussion of the problems relating to the origin of the minerals and the processes through which they passed before final deposition would at this stage be premature and inconclusive. From information obtained it appears that the

processes of lode formation are very complicated and are still more obscured by the alterations resulting from the action of later mineralising solutions.

In the first place, there are two striking facts about the occurrence of this nickel ore. One is the constant association of the minerals pyrrhotite, pentlandite and chalcopyrite; the other is the association of the ore with narrow dykes of basic rock consisting either of gabbro, norite, peridotite or an orthorhombic pyroxenite. Apparently the ore minerals favour pyroxenite and peridotite in preference to gabbro for all the important shoots of ore are associated with those rocks. This association is so striking that a casual connection is looked for between them. The explanation is that from a molten mass of irruptive rock sulphides of iron, nickel and copper became concentrated in the more basic portion, and this partly segregated mass was injected in the form of narrow dykes into the superincumbent strata. The dykes are so narrow that the final concentration of the rich ore on the footwall side could not have been due to magmatic segregation alone. Moreover, deposits of primary nickel-bearing ore extend into the slate footwall rock. It is evident, therefore, that the concentration of the ore in the lode channel was brought about by deposition from migrating solutions. Analyses of the pyroxenite and examination of hand specimens reveal the presence of nickel, copper and iron sulphides in this rock. Although, as a rule, these minerals occur in intimate association there is a greater concentration of the copper component near the walls of the lodes. Specimens show also galena and quartz succeeding the chalcopyrite, and chalcopyrite veins are found quite apart from any other mineral in the slate on the footwall side of the main ore-bodies.

GEOLOGIC STRUCTURE IN RELATION TO ORE-DEPOSITION
AND SUBSEQUENT REPLACEMENT OF THE METALLIC MINERALS
BY SILICA IN THE FORM OF QUARTZ

The zinc-lead as well as the copper-nickel ore deposits have been explored at several points to a depth of 100 feet. So far as exploration has been carried along the course of the ore-bodies, it has been found that the metallic minerals at this depth give place wholly, or in part, to white opaque quartz. Before proceeding further it should be mentioned that the sulphides of nickel, copper and iron, and also of zinc and lead in the parallel ore-bodies, above that level, are primary and, as a rule, are associated with siderite. Secondary sulphides are of common occurrence above water-level, not in any considerable amount but sufficient to indicate that leaching has been very extensive by silica-burdened solutions. In the parallel zinc-lead lodes secondary galena and sphalerite with secondary carbonates of iron and lime are of common occurrence in association with older siderite. The nature of the minerals composing the gangue indicate that the solutions were alkaline. Because their sulphates are so soluble nickel and copper were readily removed from the deposits. These sulphates do not oxidise and hydrolise like iron sulphate to form the trivalent oxide and so the former are carried away in solution while the latter, where conditions are favourable, is deposited as limonite.

Very little exploratory work has been performed at the level of the quartz-replacement zone owing in part to the comparative paucity of the ore in metallic minerals, and in part to the heavy cost of drainage, consequently precise information is meagre. These cavernous quartz lodes provide migration channels for underground water, and are, apparently, continuous for very long distances. The rate of flow of the water in any of the shallow shafts is not less than 30,000 gallons per hour, and very little of it is meteoric. Where the lodes were intersected in the underground workings great outbursts of water under considerable pressure occurred. This water was not derived from the drainage of the marshes, but from another and far-distant source. The determination of water-level is most important in the consideration of the existence of metallic ores at depth. Bearing on this matter evidence is sought in adjacent areas.

In his report on the adjoining Renison Bell tin-field L.K. Ward refers to the difference in altitude between the several outcrops of the basic intrusive. He states: "The difference may be due in part to subsequent warping of the crust, but when other outcrops are taken into account besides the two cited it becomes apparent that the upper surface of the original intrusion must have been an extremely irregular one; and the irregularities have been reduced rather than accentuated by the progress of denudation." "The several exposures of the basic rocks must necessarily be regarded as possessing continuity in depth; and the slate of the greater portion of the field is therefore resting upon an igneous foundation, the upper portions of which are exposed at the surface here and there." This observation by Ward has been confirmed by the writer in his investigation of the nickel-bearing part of the district. The basic intrusive extends in the form of a semi-circle around the north-eastern edge of this basin-shaped area and west of it other outcrops are known. From this and the information referred to elsewhere it is evident that the slates and tuffs at no great depth below the surface repose on a foundation of basic rock. It is considered that the plane of junction between these dissimilar formations determines water-level, and that a portion of the water finds its way into this channel from the line of outcrop along the outer edge of the basin, although the main source is evidently deeper-seated.

On the evidence obtained it is considered that below water-level the greater part of the copper-nickel and zinc-lead ores has been removed. Coursing through the centre of the field in a direction 7° W. of N. are two narrow parallel dykes of basic igneous rocks about five chains apart. One consists of coarse-grained gabbro and has not been explored; the other consists almost wholly of pyroxenite and peridotite, and along the foot-wall of this dyke the rich shoots of ore are found. The length of shoot is controlled by the presence of faults, which cross the lode line in a north-west direction and dip to the south-west giving to the ore-shoots a southerly pitch. Immediately to the north of the faults no ore is found, but zinc, lead and copper minerals, in some cases, occur away from the lode in the fault channel in association with quartz. In all cases the rich deposits of copper-nickel ore begin at and extend from the points of intersection of the dykes by faults. This condition applies also to the deposits of zinc-lead sulphide ore occurring in lodes apart from and parallel to the aforementioned.

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The information obtained was too indefinite to make a conclusive pronouncement upon the questions raised.

THE MINING PROPERTIES

Copper-Nickel Mines

The occurrence of copper-nickel ore in this field was first reported about the year 1900, and reward claims were granted the discoverers. At the outcrop the deposit gave promise of commercial importance, but later developments disclosed only a short shoot of ore and the prospect was abandoned. In 1912 attention was again directed to the field following the discovery of another and more valuable ore-body by one William Davie, and shortly afterwards further important discoveries were made on the adjoining Dundas-Cuni properties. The leases of Davie's sections were sold to the Melbourne Copper-Nickel Co. who conducted operations with marked success until the advent of the Great War. Success also attended the efforts of the Dundas-Cuni Company in their operations. This year another body of ore was located by one J.G. Devereau at a point half a mile to the south-west of the old Reward Claim.

The mining of these ores cannot be regarded yet as an established industry, but developments show such encouraging results that preparations are now being made for their exploitation on a commercial scale.

The Dundas Cuni-Mining Co.

Area, etc.

The property of this Company now comprises mineral leases 6003 M of 80 acres, 4495 M of 77 acres and 4496 M of 80 acres.

The Ore-Bodies

South Lode

The ore consisting of pyrrhotite, chalcopyrite, and pentlandite occurs at the contact of pyroxenite and slate, and in places small offset deposits of lenticular shape are found wholly contained in slate. At the 75 feet level of the South shaft the length of ore-shoot is 90 feet apparently contained between two faults which dip to the south-west and give a southerly pitch to the ore-body.

The ore-body has been explored to a depth of 75 feet, and a start had been made for the sinking of the main shaft to a lower level when events compelled the suspension of all operations. At the 75-feet level very little leaching has taken place and the prospects of the continuance of the rich ore are such that the proposed sinking of the shaft is justifiable.

Analyses of specimens of the ore from the South shaft workings show the following composition:-

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	<u>Sample No. 1</u>	<u>Sample No. 2</u>
Copper	6.45 per cent	4.6 per cent
Nickel	17.08 " "	12.7 " "
Iron	32.85 " "	37.9 " "
Sulphur	35.26 " "	39.9 " "
Silica	1.63 " "	1.30 " "
Lime		1.90 " "
Arsenic		0.05 " "
Bismuth		0.01 " "
Zinc		0.50 " "
Lead		0.50 " "
Gold		Trace
Silver		Trace

North Lode

Toward the north boundary of section 4495 M a lode two to three feet wide is exposed in a shallow trench 60 feet long. A gossan capping consisting of limonite with a little azurite, malachite and melanterite gives place at a depth of three feet to unaltered sulphidic ore, which differs considerably from that of the South lode. A noticeable feature is the predominance of nickel sulphide over pyrrhotite, and in hand specimens chalcopyrite appears subordinate.

The ore-body occurs on the footwall side of a pyroxenite dyke and rests on slate.

A shaft, 65 feet deep, penetrating the ore-body set free the large quantity of water contained in and flowing through this vughy lode. Two pumps placed in the shaft were unable to cope with the heavy flow of water, and these workings, in consequence, were abandoned until pumping machinery of greater capacity could be procured. Up to the present time no further attempt has been made to unwater this shaft.

The prospects here are decidedly encouraging.

Another shoot of ore has been cut in a cross-trench (No. 5) on section 6003 M. Where cut it is small and not of high grade, but probably this represents the end of the shoot as it was not out in No. 4 trench. No further work has been performed to determine its extent and value.

Developments

Developments consist of seven long cross trenches, several shallow shafts, and two large shafts for mining operations. Up to the present time the mining of ore has been confined to the South workings, and here to a depth of only 75 feet.

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A considerable amount of driving and cross-cutting has been performed, and the greater part of the ore has been stoped between the working level and the surface.

Analyses of bulk samples of the ore in the south drive at 75 feet level are as follow:--

Distance from Shaft, in feet	Width of Lode		Copper Content	Nickel Content
	ft.	ins.	Per Cent	Per Cent
25	4	3	7.58	6.0
34	4	3	4.2	9.17
40	4	0	5.0	8.0
46	2	6	3.7	11.72
52		6	2.9	8.0
59		2		
62	3	0	4.1	9.0
67	4	6		
78	5	0		

At 67 feet the lode was 6 feet wide of which 4 feet 6 inches was high grade ore and the remainder quartz. At 78 feet there was 5 feet of ore on the west wall of the lode and 2 feet 6 inches of low grade siliceous ore on the east. Eight feet farther on the ore on the west wall cut out and at 96 feet the end of the east branch was reached.

Proposed Scheme of Operations

It is proposed by the lessees of these properties to explore the ore-bodies at depth by means of drilling machines before new mining works of any magnitude are undertaken. If the results of the boring are satisfactory operations will be resumed at the south shaft with the steam-driven plant now in place. First, the shaft will be sunk to 150 feet and the ore-body explored at that level. At the same time a commencement will be made with the equipment of the north workings for the unwatering of the shaft and the development of that ore-body.

Presuming that developments warrant it, a suction gas plant of 250 H.P. will be erected at the siding to generate electricity for the transmission of power to all the mines.

This policy of exploration and development is regarded as sound and such works are fully justified by the prospects.

Production

Details of shipments of ore to Europe are as under:-

420 tons shipped 24th December, 1913 contained 5.53 per cent of copper and 11.57 per cent nickel; 10 tons shipped to London contained 5.12 per cent copper and 10.37 per cent nickel; 59 tons shipped to Europe contained 5.12 per cent copper and 11.66 per cent nickel; 20 tons contained 5.53 per cent copper and 11.57 per cent nickel.

Estimated quantity of ore in stock on

24th June, 1914

680-0-0

The total production to date 1189 tons.

Ore of the grade shipped to market was worth about £5 per ton at the mine in 1914.

Preparation of the Ore for Export

No preliminary treatment was made originally in the preparation of the ore for shipment. It was selected by hand and bagged, and in that condition sent to market. It was found that shipment of the ore as it was taken from the mine was objectionable owing to the concrete action induced by the rapid oxidation of the sulphidic mineral components and also to the possibility of spontaneous combustion resulting from the rise in temperature following this chemical change. One shipment at least caught fire in transit. If the ore is exposed in heaps to the action of the elements it becomes so concreted by oxidation that explosives are necessary to break it up. When dry the minerals composing the ore are fairly stable and can be stored with safety.

In order to prepare the ore in a condition safe for shipment the preliminary operation of heap-roasting was adopted. The subjoined table gives an idea of the change that takes place in the composition of the ore as the result of roasting in heap:-

(Quantity treated 145 tons)

	<u>Unroasted Ore</u>	<u>Roasted ore</u>
Copper	5.12 per cent	6.3 per cent
Nickel	11.28 " "	12.3 " "
Sulphur	37.3 " "	22.2 " "
Iron	34.0 " "	41.6 " "
Silica	2.16 " "	2.6 " "

Although this ore has been profitably mined, the cost of transport to market is a big tax on its value. Concentration of the ore to a much higher grade product is necessary, but concentration by physical means is out of the question. What is required and what is proposed is the erection of a small blast furnace for the conversion of the ore into a copper-nickel-iron matte. The only difficulty

presented is that of supply in order to keep the furnace in continuous operation. By this treatment a high grade product will be obtained and any precious metals in the ore will be concentrated in the matte and will be recoverable in the refining process. Metals of the platinum group and gold and silver concentrated in the matte will add appreciably to its value.

THE MELBOURNE COPPER-NICKEL MINE

Area

This property is now held under lease by J.H.S. Munro of Zeehan. It comprises one section only of 40 acres, the old Nickel Reward lease having been forfeited recently.

The Ore-Bodies

In every respect the ore is similar to that of the Dundas-Cuni lodes and occurs under similar conditions. There are two known ore-shoots, one 60 and the other 80 feet in length. The width varies from a few inches up to ten feet, and the rich ore has been followed to a depth of 122 feet. In these bodies the ore occurs in lenticular masses. They pitch at an angle of 52 degrees to the south and have an easterly dip of 53 degrees.

Developments

These ore-bodies have been explored by means of trenches, two shafts, and by five bore-holes. Owing to the water difficulty it was decided by the operators to carry out the preliminary exploration by drilling as this method would prove not only more expeditious but less costly. In the performance of this work No. 1 bore hole was drilled to cut the ore-body at a depth of 50 feet below the exposure at surface. From the collar the drill passed through intercalated bands of slate and tuff before entering norite and pyroxenite at 64 feet. On the other side of the dyke rock ten feet six inches of ore was found resting on the slate footwall. No. 2 bore hole was drilled to cut the ore-body at 100 feet below the outcrop. Where cut the norite was found to be only 12 feet thick and the ore only 10½ inches. The remainder of the lode consisted of quartz resting on a footwall of slate as before. No. 3 bore sunk to intersect the ore body at 200 feet was fruitless. Likewise no important result was obtained by the drilling of No. 4 bore located 50 feet to the north of No. 1, and No. 5 bore, 80 feet to the south of No. 1, failed to reveal payable ore. In order to test the Blowfly ore-shoot outcropping some distance to the north two holes were drilled to cut the contact country fifty feet below the surface. These operations were unsuccessful; but afterwards 52 tons of ore from one, and 252 tons from the other locality were obtained from shoots occurring in short lenses near the surface. This ore contained 12 per cent of copper and 9 per cent of nickel, an appreciable variation from that of the main workings.

Main shaft was sunk to 127 feet, and working levels were opened at 70 and 122 feet. Between the upper level, which was driven 27 feet in a northerly and 52 feet in a southerly direction from the shaft, 2500 tons of ore containing 10.4 per cent nickel and 5.2 per cent copper was obtained. At the 122 feet or lower level ore was not found at the end of the cross-cut, it having cut out about three feet below the point of intersection of the No. 2 bore. Instead a 3-foot vughy lode of crystallised quartz with chlorite and a little pyrite was found. No ore was obtained in driving northward, but to the south it was met at 11 feet and was followed 30 feet showing an average width of 3 feet. A leading stope 18 feet long was taken out above this level.

Production

Prior to the sale of this property Davis and Party obtained 73 tons of ore by trenching along the lode a distance of 83 feet. This ore was sold in two lots, the particulars of which are given hereunder:-

Dry Weight		Composition		Value
Tons	cwt.	Copper per cent	Nickel per cent	
19	4	4.9	11.4	£ 94
53	12	5.2	10.0	£227

The purchases were made by Elder Smith & Co. on the following basis: The sum of five pounds five shillings per ton was offered for ore (Delivered in railway trucks at Zeehan) containing 5.3 per cent copper and 11.8 per cent nickel. To this sum five shillings was to be added to the price for each unit of copper and twelve shillings for each unit of nickel in excess of the amount stipulated, and four shillings and six pence was to be deducted for each unit of copper and eleven shillings for each unit of nickel below the standard percentage.

The Melbourne Copper-Nickel Co. in their fifteen months operations produced 2776 tons of ore valued at £14,026. From this sum the cost of machinery was refunded and £9600 was paid in dividends to the shareholders.

It is estimated that there are from 1000 to 1500 tons of proved ore of similar grade. In addition, about 200 tons of high grade ore is stacked at surface ready for shipment.

DEVEREAUX PROSPECT

Area, Situation, etc.

Lease 8851-M of 10 acres has recently been granted to J.G. Devereaux for the mining of copper-nickel ore. Occurring half a mile to the south-west of Nickel Reward shaft this is an offset deposit from the main line of lode.

The Ore-Body

At surface a foot of gossan with zaratite (carbonate of nickel) rests on unaltered sulphidic ore, which, contrary to the general rule, contains a far greater proportion of copper than nickel. The pyrrhotite component is not at all prominent, and pentlandite, usually difficult to detect, is here easily recognised in specimens not rich in pyrrhotite.

The ore body has been exposed in a few shallow holes, but no idea of its extent can yet be formed. At surface it is 12 to 18 inches wide and appears to follow a northerly trend in conformity with the general course of the other lodes. No trace of this body has been found in the railway cuttings to the north and there are no gossan indications of its occurrence in that direction. How far it extends to the south can be determined only by trenching through the marshy soil cover.

About 20 chains to the east there are indications of another lode in a quartz outcrop. Another lode, consisting almost wholly of quartz, has been exposed on the 10-acre block. This has a north-west trend and probably it is an extension of Devereaux' galena lode held by him under lease 6952-M.

The following analyses carried out at the Mt. Lyell Co's. works show the composition of the ore at Devereaux Prospect.

	<u>Sample No. 1</u>	<u>Sample No. 2</u>
Copper	18.1 per cent	14.0 per cent
Nickel	5.5 " "	6.6 " "
Iron	27.5 " "	29.7 " "
Sulphur	24.8 " "	
Cobalt	0.6 " "	
Silica	7.9 " "	
Zinc	3.2 " "	
Lead	Trace	
Bismuth	Trace	
Alumina	3.1 " "	
Silver	1.4 oz. per ton	1.1 oz. per ton
Gold	0.02 " " "	0.04 " " "
Platinum	0.10 " " "	0.16 " " "

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NICKEL REWARD PROSPECT

This section lies south and adjoining the Melbourne Mine lease and the workings are situated in the angle formed by the crossing of the Emu Bay and North-East Dundas railways.

This lode was discovered many years ago and was explored to a depth of 20 feet by G. Beaudsley, Metallurgist to the Mt. Lyell Mining and Railway Co. The deposit occurs at the contact of slate and decomposed gabbro and is very irregular in thickness and extent. Several parcels of ore were obtained from these shallow workings, containing 8 to 12 per cent nickel, 3 to 5 per cent copper, a little silver and a trace of gold. The ore is composed principally of nickeliferous pyrrhotite, with also a little millerite.

In order to test this body at depth two holes were drilled by the Melbourne Nickel Co. who at the time held the lease of this ground. In both cases these exploratory works were unproductive of good results.

CONCLUDING REMARKS

It is only within recent years that the mining of nickel ores has come into prominence in Tasmania. As this is the only area in Australasia from which nickel has been produced in commercial quantities it is of more than passing interest. Few nickel occurrences of such high grade material are known and this fact should encourage prospectors to persevere in their efforts to discover other and larger bodies in the main mass of basic rocks traversing the area. As exploration goes on doubtless other deposits will be found in the neighbourhood and in the country intervening the known deposits. Occurrences are reported as far south as Leslie Junction on the main line of lode and northward to the railway tunnel. Attention should be directed to the norite and pyroxenite dykes for associated with these the ore will be found.

Nickel is known at the King Curtain mine north of Ringville, at the Pimple north of Dundas, and in large low-grade deposits in the neighbourhood of Remine. During the recent examination of the Swansea area the writer found nickel ore in altered pyroxenite at several points along the foothills of Mt. Zeehan. Between that locality and Remine a large potential area remains to be explored.

The various known occurrences in other areas have been mentioned in order to direct attention to the possibility of obtaining sufficient supplies from all sources to warrant the erection of a small nickel smelting plant at Zeehan for on this the future of the industry largely depends.

There appears to be a brighter outlook for the nickel industry in Tasmania and attention should be given to its development.

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The writer desires to acknowledge his indebtedness to Major T.H. Vincent, Manager of the Dundas-Cuni Mine and Mr. H.A. Vaudeau, Inspector of Mines and formerly Manager of the Melbourne Copper-Nickel Mine, for much information relating to the occurrence of the ore in the underground workings of these mines.

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