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ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

INTERIM REPORT ON THE CAMP 30 MERTON AREA, TASMANIA

by

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(A) INTRODUCTION

Serpentinites, both foliated and massive varieties, and pyroxenites occur in a roughly N-S trending belt throughout the area studied. Associated with these rocks are gabbroic rocks and amphibolites. The whole belt of rocks can be traced for over 11 miles from near Renison Bell in the South, to the intrusive Meredith Granite in the North. They show a close similarity to many other ultrabasic bodies in Western Tasmania and Banks (1) has shown that these rocks are probably Middle Cambrian in age. It is now proposed that individual consideration be given to the petrology of areas of interest.

(B) THE GENERAL GEOLOGY OF THE SERPENTINITE BELT

See sketch map C-68-1.

The Three Mile Creek Area

In the Three Mile Creek area the rock types present include massive and foliated serpentinites. The massive serpentinites predominate over their foliated counterparts. Associated with the ultramafic rocks are small masses of altered (or metamorphosed) basic rocks.

The best exposures of serpentinite are found in Three Mile Creek and on the slopes adjacent to the creek. The outcrop density decreases markedly on the flat ridges which flank the creek.

In Three Mile Creek itself, the available structural data (from foliated masses of serpentinite) indicates a single set of S surfaces which dip in a NW-SE direction at moderately high (60°) to high ($80-90^{\circ}$) angles.

The serpentinites in this area are partly covered by a layer consisting of haematite and limonite. This layer attains a maximum thickness of 20 feet on "Limonite Ridge". Similar cappings are present in the Bealey Creek, Sweeney Creek, and Trinder Creek areas. These are all to be discussed at a later stage.

Petrography

Massive serpentinites are abundant within the Three Mile Creek area. The foliated serpentinites are confined to narrow zones within the massive textural varieties.

The massive serpentinites, in handspecimen, are dark grey-green in colour and have a high specific gravity. "Bastite" (tabular antigorite after pyroxene) eyes are common in the rocks. The finer base of the rocks consists of serpentine, presumably pseudomorphous after olivine and finer pyroxene. Accessory spinel (?) magnetite plus cross-cutting veins of chrysotile are also abundant. A detailed description of the massive serpentinites is to be provided in the final report.

Foliated Serpentinites

Foliose serpentinites are of moderate importance in this area. The foliated varieties occur in narrow zones on the western slope of Limonite Ridge. Elsewhere massive serpentinites are found in outcrop.

In handspecimen the rocks are dark green in colour. The foliation is defined by (a) the orientation of serpentine and (b) the elongation of magnetite particles such that their greatest dimension is parallel to the foliation. The foliation dips to the NW and SE at angles ranging from 60° to nearly 90°.

Basic Rocks

A small mass of rocks of suspected basic character occurs along the western contact of the serpentinite belt in Three Mile Creek. The rocks appear to be essentially gabbroic. The origin of the basic rocks is not known precisely and no firm conclusion can be drawn as to the relationship between the ultramafic and mafic masses.

The mafic rocks are also found to the north of this area. They occupy a similar position to that observed in Three Mile Creek, that is they occur along the western contact between serpentinite and sediments. It is this contact which is to form a part of later discussion.

Petrography

Megascopically the basic rocks are dark green in colour. They are characterised by a rather coarse grainsize. The rocks contain tabular plagioclase feldspar set in a "base" of rather altered material, possibly clino-pyroxene.

The extensive alteration of these rocks precludes positive identification of the finer grained mineral constituents.

The Ironstone* Capping

It is now proposed to briefly outline the origin of the "ironstone capping" at Three Mile Creek, for cappings elsewhere appear to have a similar origin.

The origin of the cappings is very important when considering the possibility of mineralisation.

It is possible to postulate two origins for the ironstone capping in Three Mile Creek. These are:-

(i) That the capping has formed as a result of laterisation of the serpentinite

(ii) That the capping is a gossan over mineralisation within the ultramafic mass.

If suggestion (ii) were the case then extensive mineralisation would be indicated. However, surficial features (see Economic Geology section) tend to favour suggestion (i).

Alternatively, the development of a laterite horizon over the serpentinite could possibly obscure sulphide mineralisation. For this reason further investigation (both geophysical and geochemical) was necessary to determine if the latter suggestion was the case.

The results of these investigations are to be presented at a later stage.

* Note the term "ironstone" is used to signify limonite, haematite mixtures.

The Riley's Knob Area

Introduction

The Riley's Knob area lies approximately 1½ miles SE of "Camp Thirty" and is centred on Riley's Knob, a prominent hillock composed of ultramafic rocks.

The rocks in outcrop on Riley's Knob itself are coarse to fine grained pyroxenites, partly serpentinised harzburgitic dunites (?) and serpentinites. Similar rocks are found to the north and to the west of Riley's Knob.

The pyroxenites and partly serpentinised harzburgitic dunites (?) at Riley's Knob occur in alternating layers up to six inches in thickness. This layering is defined in a number of ways. It is firstly defined by the alternation of pyroxenite and harzburgite bands. Secondly it is defined by grainsize variation, that is the alternation of fine and coarser pyroxenes in the pyroxenites. This layering dips to the south-west at angles ranging from 35° up to 60°.

The pyroxene rich layers are usually extremely magnetic and they are capable of deviating the compass through ninety degrees.

A second type of layering is represented by elongate lenticles of dark material (possibly representing serpentinised pyroxene crystals) in amonst lighter material. This layering dips in a similar direction to the former layering.

The two layerings are considered to have different origins. The first layering appears to be the result of crystal settling from the original "magma". Evidence for this is provided by grainsize gradation within individual layers and by truncated layering. These features are considered by the writers to be indicative of a "magmatic" and not a metamorphic process.

The second type of layering appears to be produced by deformation. This suggestion is supported by the deformed state of the rocks, that is, the elongate small flakes of dark coloured chlorite which define a schistosity (the layering parallels the schistosity).

Within the rocks at Riley's Knob, no sulphide minerals were detected. Magnetite in the form of acicular crystals and nodular masses is, however, relatively abundant in the rocks.

In addition to the pyroxenites, partly serpentinised harzburgites and serpentinites found in outcrop on Riley's Knob small masses of gabbro and rodingite also occur.

One such mass of these rocks is found in outcrop on the lower, northern face of the knob, whilst small "floaters" of rodingite are found in the creek on the western side of the knob.

The petrography of all these rocks is to be fully described in the final report.

This area offers very little in the way of "ironstone" development for Riley's Knob is covered with a thin layer of red-brown soil. Haematite and limonite nodules occur sparsely scattered throughout this soil. The remainder of this area is likewise deficient in "ironstone".

The Bealey Creek Area

The Bealey Creek area lies approximately half a mile to the SE of Camp Thirty. It is an area dominated by button-grass and scrub.

The main outcropping rock type in this area is serpentinite with a subordinate amount of pyroxenite (see map C68-1). Within some rocks kernels of unaltered pyroxenite up to 1 ft. in diameter are enclosed by serpentine (chiefly chrysotile?). This strongly suggests that part of the serpentinites are derived from the pyroxenites by serpentinisation of the latter.

The remaining portion of the area is covered by material of glacial origin. This material consists of elliptical pebbles of quartz and quartzite and minor amounts of serpentinite set in a siliceous, grey, clay soil.

The main site of investigation in this area lies approximately $\frac{1}{4}$ mile due SE of the campsite.The studied zone is covered by an "ironstone" capping which thinly overlies serpentinite. This capping is considered to be of pre-glacial origin. Evidence for this is provided by the re-precipitated ironstone on glacial quartzite pebbles.

This "ironstone" was investigated using geophysics and geochemistry. The results of these investigations appear together with those from other areas.

The Sweeney's Creek Area

The Sweeney's Creek area is situated one quarter of a mile to the west of Camp Thirty. This area is covered with thick vegetation.

The rock types in outcrop in Sweeney's Creek are massive serpentinites. These rocks are covered by a thin brown-red soil, and in places by glacial material consisting of grey clay and quartz rich soil. Quartzite cobbles are also common.

A small capping of "ironstone" occurs on the ridge on the E side of Sweeney's Creek. This deposit occurs associated in places with material of glacial origin. It is, however, more commonly found associated with serpentinite. This capping was also studied using geophysics etc.

Trinder Creek

General Geology

The rocks in outcrop in Trinder Creek are massive serpentinites. They are, megascopically, lithologically similar to the massive textural varieties of serpentinite found in other areas. The ridges to the north and to the south of Trinder Creek are covered with an "ironstone capping". This capping appears to be at a similar elevation to the capping in the Three Mile Creek area. Geophysical investigation, together with geochemical investigation was conducted in this area.

The Merton Camp Area

General Geology

The rock types outcropping in the Merton Camp area consist mainly of massive serpentinites with minor schistose serpentinites, pyroxenites, rodingites, dolerites and altered serpentinites. These rocks form low, rounded scrub-covered hills. Outcrop is rather poor, with the development of thin, brown soils often containing limonitic nodules. The eastern contact of the serpentinite belt is marked by a sudden change in topography and vegetation.

An "ironstone" capping occurs in the camp area. This was investigated using geophysics and geochemistry. Three magnetometer lines were run over the ironstone by C. Wilson (5). A geochemical anomaly was obtained for copper, cobalt and nickel near the intersection of lines M6 and M7. However, no significant self-potential (S.P.) results were obtained. Small, thin limonitic cappings are also found covering serpentinite to the north of Merton Camp.

Merton Camp lies close to the eastern boundary of the serpentinite belt. This boundary is defined by the contact of serpentinite with sandstone and limestone. Later cross-faulting has apparently disrupted this contact (see map C68-1).

The sandstones are distinctive, white, friable rocks. They are thickly bedded and range from oligomictic quartz conglomerates to quartz sandstones. Bedding features are not usually apparent but in places the sandstones are quite fossiliferous and contain brachiopods, gastropods and pelecypods. On the basis of these fossils and lithology the rocks are believed to be equivalent to the Ordovician Caroline Creek sandstone as defined by Banks (1) in the Zeehan area to the south.

To the north limestone, which outcrops particularly well in Limestone Creek, lies along the contact of the serpentinites. The Limestone is thinly bedded, consisting of massive grey bands of limestone with numerous shale intercalations. Along the creek the limestone has a constant strike of 255° and dip 65°E. No fossils were found in the rock and its age is therefore uncertain. The relation between the limestone and the sandstone is not apparent as outcrop is very poor but the limestone

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may be an outlier of Ordovician Gordon Limestone overlying the Caroline Creek Sandstone.

The contact between the serpentinite belt and sediments is not exposed. However, the fact that the sediments are believed to be younger than the basic and ultrabasic rocks, plus the fact that the serpentinite belt cuts across the strike of the sediments at a small angle suggests that the contact is a fault contact. The presence in the Wilson River of a clay zone between limestone and foliated serpentinite also tends to support the hypothesis that this is a faulted contact.

As elsewhere in the serpentinite belt, massive serpentinites are the most common rock type in the Merton Camp area. Foliated serpentinites are also present. These consist of serpentinites showing a primary foliation due to serpentinization of an originally banded rock but more commonly consist of serpentinite showing a strong secondary foliation. In places the serpentinites show strong alteration. This is especially noticeable in the upper part of Ahearne's Creek where the serpentinites in places have been dolomitized.

Pyroxonites outcrop fairly well to the north of Merton Camp. These occur as isolated patches. They have been partially serpentinized and now occur as kernels of pyroxenite surrounded by serpentinite. The pyroxenites show considerable variation in grainsize from over 6 inches to less than ¼ inch.

Rodingites have been found in streams and as pebbles in the Merton Camp area. They are usually very coarse grained and consist of large pyroxene crystals set in a white groundmass. Occasional amphibolites have also been found in the area. These are believed to be related to some of the rodingitic rocks. They consist of large needles of tremolite-actinolite in a groundmass of feldspar and hydrogrossular garnet.

A medium grained dolerite occurs along the eastern contact of the serpentinite belt to the north of Merton Camp. Outcrop is very poor and its relationship to the serpentinite belt is unknown.

<u>The Mount Merton Area</u>

The Mount Merton area lies on the eastern contact of the serpentinite belt approximately 1 mile south of Merton Camp. This eastern contact is between serpentinite and sediments of Cambrian to Ordovician age. The sediments consist of a sequence of shales with minor labile greywackes overlain by a white sandstone. This sandstone can be traced to the north of Merton Camp and on the basis of lithology and its fossil content it may be correlated with the Caroline Creek Sandstone of the Zeehan district.

The sediments underlying this sandstone consist mainly of grey shales with minor white shales, sandstones, and labile greywackes. The grey shales in places are very fossilferous containing abundant trilobites and brachiopods with occasional pelecypods. The age of the fossils is at present being determined, but the sediments are thought to be Upper Cambrian to Ordovician in age. The labile greywackes which occur as occasional thin bands appears to be tuffaceous in origin. These rocks are often difficult to distinguish from feldspar porphyries in handspecimens.

The sediments strike at approximately 300° and have been truncated by the faulted margin of the serpentinite belt. As in the Merton Camp area later cross-faulting appears to have disrupted this contact.

The most common rock type in the serpentinite belt of the Mt. Merton area is massive serpentinite. Foliated serpentinites are also widely distributed throughout the area. Pyroxenites have been found on Mt. Merton and on Hannan's Hill. Both outcrop are small in area and appear to be partially serpentinized.

A fairly large area on Hannan's Hill is covered by very fine grained green to grey volcanics. The composition and nature of these rocks cannot be determined from handspecimen examination. The relationship between these rocks and the rest of the serpentinite belt is unknown but it is suggested that they may be a faulted-in block of fine grained spilites. A few floaters of a syenitic rock carrying pyrrhotite were found with these volcanics.

The Western Contact

The Western contact of the serpentinite belt is between unfossilferous slates with greywackes, and basic with ultrabasic igneous rocks. The sediments consist of a monotonous sequence of chocolate and grey shales, and chocolate, grey and khaki greywackes. These rocks are well exposed along the lower part of Ahearne's Creek. Identical rocks occur in the Wilson River and these have been described by Eshuys and Etheridge (3). In several places, especially in the northern part of the area, the sediments appear to have been contact metamorphosed by the serpentinite belt. They become much harder and in places carry disseminated sulphides.

Basic igneous rocks are found along the western contact in pods. These rocks consist of gabbros, dolerites, and norites (?). They commonly contain fairly abundant disseminated sulphides. The basic igneous rocks commonly have a well developed amphibolite on the borders with the ultrabasic rocks of the serpentinite belt. This amphibolite shows a very strong foliation but no lineations. Foliated serpentinites comprise the rest of the rocks of the area.

From the field evidence it is suggested that the basic igneous rocks were then in turn intruded by serpentinite causing the development of an amphibolite at the contact between basic and ultrabasic rocks.

(C) ECONOMIC GEOLOGY

Attention was drawn to the area studied by the occurrence of several aeromagnetic anomalies and by the development of extensive ironstone cappings. The only minerals produced from this area to date have been osmiridium, and minor amounts of gold and tin.

With the exception of the small Merton Hill Tin Mine, all workings have been confined to alluvial deposits.

The mineralisation found in the present investigation can be conveniently divided into three groups. These are (1) alluvial deposits; (2) sulphide deposits associated with the Cambrian basic and ultrabasic rocks; (3) later sulphide mineralisation probably related to Devonian granites.

1. Alluvial Deposits

The area studied encompasses most of the Wilson River osmiridium field. Osmiridium occurs in all major streams flowing across the serpentinite belt and is obviously, closely related to the ultrabasic rocks. The osmiridium is quite varied composition and nature and is sometimes found closely associated with gold. McIntosh Reid (4) gives a comprehensive description of the osmiridium deposits of this area.

The variation in nature and composition and its widespread occurrence suggests that the osmiridium has been derived from many primary deposits over the whole belt. It probably occurs as rare, disseminated grains throughout the serpentinite or as irregularly distributed differentiation bands.

Chances of further significant discoveries of alluvial osmiridium are poor. Similarly the chances of discovery of any important primary deposit of osmiridium are poor.

Other alluvial minerals mined from the area include tin and gold. Production of both of these has been insignificant. The gold has probably been derived from the ultrabasic rocks, where it is found in association with osmiridium, whilst the tin has probably been derived from quartz porphyry dykes reported in the area by McIntosh Reid.

Chromite, magnetite and picotite are present in all the alluvial deposits. The deposits, however, have no economic potential.

2. Sulphides in the Cambrian Basic and Ultrabasic Rocks

Original interest was drawn to the area by large ironstone cappings, aeromagnetic anomalies, and favourable rock types for nickel and copper mineralisation.

During the present programme the ironstone cappings were mapped and proved to be much more extensive than originally realised. Because of the large areas that these ironstones cover, the authors believe that they may be due in part, at least, to laterisation of an old serpentinite surface. Facts that point to a lateritic origin for the ironstones include:

(i) the absence of primary sulphide textures i.e. boxwork gossans;

(ii) the presence of limonite pisolites, similar to those developed in lateritic profiles;

(iii) the common development of a pallid zone of yellow or white clay underlying an ironrich horizon;

(iv) the large areas covered by the ironstones;

(v) the topographic control on the ironstones. The ironstones are developed more prominently over ridges than in creek beds.

Because of the similarity of the ironstones to gossans, most of the work done in the area was geochemical and geophysical testing of these ironstones for evidence of mineralization.

Sulphide minerals have been found along the western contact in the northern part of the area studied. Minerals include pyrite, pyrrhotite, chalcopyrite, and pentlandite. This mineralization is disseminated in contact rocks consisting of gabbros, dolerites and amphibolites. No well developed gossans or any signs of massive mineralization were found over this area. No mineralization has been found in pyroxenites or serpentinites. This is similar to the Five Mile area to the south where significant mineralization is restricted to dolerites.

3. Sulphide Mineralization in Sediments

Gossans were found in a number of places in sedimentary rocks adjoining the serpentinite belt. The best developed of these was at the Mount Merton Tin Mine. A number of trenches and adits have been dug into these gossans. The gossans contain boxwork structures indicating that they were derived from sulphides. However no cassiterite was seen.

The country rock is sandstone of Ordovician age, and the mineralization was probably controlled by minor faulting related to the major fault along the western contact. Some small trenches occur to the north near Merton Camp. These are similarly close to the western contact of the serpentinite belt. However no gossans were found in this area. The tin mineralisation is probably related to Devonian acid igneous activity. McIntosh-Reid (4) records the presence of small feldspar porphyry dykes in the area.

On a traverse east of Limestone Creek a small gossan outcrop was found. This occurred as manganiferous and limonitic boulders showing primary sulphide textures. No secondary lead, copper, or nickel minerals were seen. Rock exposure in the area is very poor and glacial material appears to cover part of the gossan. Limestone outcrops approximately 50 yds. north-west of the gossan. McIntosh-Reid records the presence of disseminated galena and pyrite in limestone along Limestone Creek.

A small patch of gossan was found near Ahearne's Creek close to the western contact of the serpentinite belt. This gossan was developed over chocolate shales and greywackes and was associated with a prominent quartz vein. The quartz vein was approximately 2' thick and could be traced discontinuously for about ¼ of a mile. It was considerably iron stained and contained boxwork structures after sulphides.

A similar occurrence is found along the western contact of the serpentinite belt to the south near Jordan Creek. Here minor chalcopyrite and pyrite are found in grey shales. These minerals are associated with quartz veining in the rocks. There appears to be no significant development of gossans.

(D) GEOPHYSICAL AND GEOCHEMICAL RESULTS

1. Magnetometer Survey

Magnetometer traverses were conducted over selected surveyed lines within the areas described previously. The results are presented as magnetometer traverse profiles (see appendix).

In general the magnitude of the readings obtained over the serpentinite belt are in the order of 7,000 gammas. Three factors are considered to be responsible for the production of significant magnetic anomalies. These are:- (i) the presence of magnetite in the soil horizon and bedrock;

(ii) the presence of sulphides;

(iii) the presence of material of lower magnetic susceptibility than serpentinite, in this case glacial material.

Magnetic anomalies possibly attributable to sulphide (pyrrhotite) would be important, for it must be remembered that pyrrhotite is associated with nickel and copper minerals in the Cu-Ni Five Mile area.

Anomalies produced by the other two sources have no economic significance in this area.

The results are now to be interpreted.

A. Three Mile Creek Area

Line A*. A small anomaly of 2,500 gammas occurs at the 900 foot station. The SP traverse, however, does not give an anomaly. The magnetic anomaly appears most likely to be produced by local enrichment of magnetite in the soil and bedrock.

Line A. No significant magnetic anomalies.

Line B. Two small anomalies of 2,000 gammas between stations 0 and 100 and 5,000 gammas at station 1100. Small S.P. anomalies are present over these stations. This suggests that either sulphides are present, or alternatively the anomalies are produced as in Line A* (the S.P. results may be purely fortuitous).

Line D. Two anomalies are present. These are both 3,000 gammas in magnitude. S.P. results yield no anomaly. Interpretation is as in Line A*.

Line E. Three anomalies are present. The first has a magnitude of 6,500 γ (gammas). It occurs at the minus 100 foot station. A S.P. anomaly of 80 millivolts occurs over the same station. The two other magnetic anomalies of 4,000 γ (station 150) and 5,000 γ (station 900) are also associated with S.P. "kicks".

Interpretation: as for Line B.

Lines AA*; AB; BD. The largest anomaly of 20,000 γ occurs at station 50 (on AA*). This anomaly seems most likely to be explained as being due to magnetite, since the S.P. results show no abnormality.

Three other anomalies occur along these lines. These are located at stations 650 (6,000-7,000 γ); 1000 (4,000 γ) and 1450 (5,000 γ). Available evidence suggests that these anomalies are due to localised magnetite segregations within the host serpentinite.

B. Trinder Creek

Line R7. Two anomalies occur along this line. They are small in magnitude (1,500 γ at station 450/west; 3,000 γ at station 800/east). The S.P. traverse indicates no significant S.P. anomalies.

Interpretation: as for Lines A*, AA*, AB, BD.

Line R8. Two magnetic anomalies occur. They have magnitudes of 5,000 γ (station 50/east) and 2,000 γ (station 350/east). The latter anomaly is associated with a small S.P. anomaly.

Interpretation: as for Line B.

Line R9. A single magnetic anomaly of 4,000 γ occurs on line R9 at station 100/east. No significant S.P. anomaly is recorded over this station.

Interpretation: as for Lines R7, A*, AA, AB, BD.

Line R10. No significant magnetic anomalies.

Line R11. As for Line R10.

C. Bealey Creek Area

Line R2. Magnetic anomalies occur at the following stations: 300 feet (magnitude 3,000 γ); 2,050 feet (5,000 γ); 3450 feet (3,000 γ) and 3,900 feet (2,000 γ). The first two anomalies have no S.P. or geochemical anomalies associated with them. They are thus interpreted to result from magnetite enrichment.

The second set of anomalies, in contrast are associated with prominent S.P. anomalies of 90 millivolts (station 3550) and 40 millivolts (station 3850). These anomalies also coincide with a pronounced anomalous zone for cobalt/nickel (see accompanying geochemical map).

Interpretation: Geophysical and geochemical techniques define a pronounced anomalous zone on this line. It is suggested that mineralisation is possibly responsible for these anomalies.

D. Sweeney's Creek

Line R4. No significant magnetic anomalies.

Line R5. No significant magnetic anomalies.

<u>Line R6</u>. One anomaly occurs on this line (2,000 γ at station 400). This anomaly appears to be the result of glacial material which covers serpentinite up to a depth of ten feet in this locality.

E. Summary

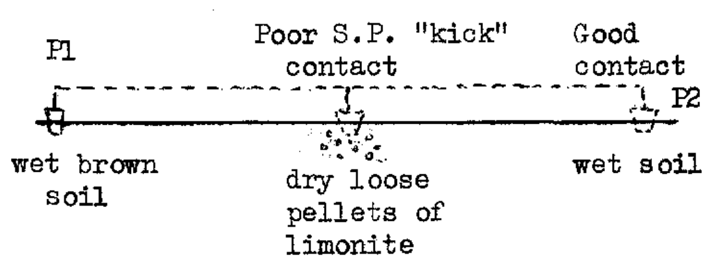
Of the examined lines, the lines B, E, R8 and R2 are considered to have magnetic anomalies of possible significance (to mineralisation) developed over them.

Line A* must also be considered, for an anomaly of 20,000 γ produced by sulphide along this line.

2. Self-Potential Surveys and Geochemical Surveys

Self-potential surveys and geochemical sampling was carried out over all the cut and pegged lines. For convenience the results of these are to be grouped below.

Small S.P. "anomalies" are obtained on most of the lines. A number of these are considered to have no significance for they are thought to result from differing degrees of contact between the pots in the ground (see below).



Similarly it can be said that some small S.P. anomalies are significant. The distinction between the significant and non-significant S.P. anomalies is very difficult. Some degree of distinction is obtained using geochemical and magnetic data, and information collected during geochemical sampling (the nature of the ground into which the pots are being placed).

The coincidence of geochemical, magnetic and S.P. anomalies suggests that the S.P. readings may be significant.

Summary of Self-Potential and Geochemical Survey Results

A summary of S.P. and geochemical results is given below. The results of individual line surveys are found in profile form in the appendix.

	S.P. Anomaly	Station	Geochem. Anomaly (Magnitude)	Station
Three Mile Creek Area				
Line A	130 M.volts	0	800 Ni 100 Co	200
	50 M.volts	750	4000 Ni	800
	-	1100	2000 Ni 1400 Co	1100
Line B	80 M.volts	600	1500 Ni	600
	30 M.volts	1050	-	-
	-	-	500 Ni	900
	-	-	8000 Ni 800 Co	1200
Line A*	No significant S.P. anomalies		2900 Ni	0
			3700 Ni 1600 Co	550
			2700 Ni 900 Co	1000
Line C	No significant S.P. or geochemical anomalies			
Line D	No significant S.P. anomalies		Ni	700
Line E	No significant S.P. anomalies		Ni	500
Line A1	No significant S.P. or geochemical anomalies			
Line A2				
Line A3				
Bealey Creek Area				
Line R1	No significant S.P. anomalies		4000 Ni	200
			8000 Ni 1500 Co	500
Line R2	50 M.volts	1750	3000 Ni 1000 Co	1900
	90 M.volts	2550	+ 3000 Ni 700 Co	2500 2800 3300
	90 M.volts	3550		
	40 M.volts	3850		
Line R3			3000 Ni 800 Co	2300
			2500 Ni 1400 Co	4200

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	S.P. Anomaly	Station	Geochem. Anomaly (Magnitude)	Station
Trinder Creek				
Line R7	No significant S.P. results		4000 Ni 4000 Ni 6000 Ni 2200 Ni 2000; 3000 Ni	100/E 250-350/E 650/E 750/E 100/W; 300/W
Line R8	40 M.volts	100/W	2800 Ni 100 Co	100-150/E
Line R9	70 M.volts	300/E	4000 Ni 300 Co	200/E
Line R10	-		2000 Ni 70 Co	350/E
Line R11	-		3000^{+}Ni 3000 Ni	150 350
Sweeney's Creek				
Line R4	40 M.volts	350	1500 Ni	150
Line R5	70 M.volts	150	1500 Ni	0
Line R6	No significant S.P. or geochemical anomalies			
Mount Merton Area				
Line M1				
Line M2	No significant S.P. or geochemical anomalies			
Line M3				
Line M4				
Hannan Hill Area				
Line M12	No significant S.P. anomalies		450 Ni 50 Cu 80 Cu 95 Cu	100 300 400 550

	S.P. Anomaly	Station	Geochem. Anomaly (Magnitude)	Station
Hannan Hill Area (continued)				
Line M13	No significant S.P. anomalies		1100 Co 5000 Ni	0
			1100 Co 5400 Ni	100
			30 Cu	200
			40 Cu 250 Ni	450
Merton Camp Area				
Line M14	No significant S.P. anomaly		No Geochemistry done	
Line M6	No significant S.P. anomaly		20 Cu	150W
			10 Cu 350 Co 500 Ni	250E
Line M7	65 M.v.	100	5 Cu 200 Co 400 Ni	350E
Line M8	60 M.v.	100E	10 Cu 400 Ni 150 Co	0
Line M9	No significant S.P. or Geochemical anomalies			
Line M10	No significant S.P. anomalies		10 Cu	100-150
Line M11	No significant S.P. or Geochemical anomalies			
Ahearne's Creek Area				
Line J1	No Geophysics done			

Interpretation of the Results

Self potential anomalies most commonly indicate the presence of sulphides. Magnetite under extreme conditions of oxidisation can produce an S.P. pattern (Dobrin 1952). However, this pattern should be quite regular. Self-potential anomalies are considered to be indicative of sulphide mineralisation within the Camp Thirty Area.

Geochemical anomalies for nickel are produced from two sources. These are: (i) an increase, locally, in the nickel content within serpentine. ("silicate phase").

(ii) nickel bearing sulphides are contained in the serpentinite.

The first case is not significant economically, since the nickel content is far too low to treat silicate material.

The coincidence of S.P. magnetic and these geochemical anomalies would give rise to a good chance of the nickel being associated with sulphide mineralisation. From the results of S.P. and geochemical analysis most nickel "highs" appear unassociated with S.P. "highs". However, in certain cases S.P. "kicks" are associated with magnetic and, or geochemical anomalies.

Table. Showing Nickel and Nickel/Cobalt Anomalies

Anomaly Number	Location	Remarks
1	Bealey Creek District on Line R1	Pronounced geochem. anomaly. S.P. results negative. Magnetometer traverse not used.
2	Bealey Creek District between lines R2 1000 and R3	Pronounced geochemical anomaly. S.P. results negative. Magnetometer survey indicates very small (1,000 γ anomaly)
3	Bealey Creek District on line R2	Linear geochem. anomaly. Associated with prominent S.P. and magnetic anomalies.
4	Three Mile Creek District on line R2	As for anomaly 3.
5	Three Mile Creek District on lines A*, A	Elongate anomaly (over 600 feet long). Associated with magnetic and S.P. anomalies.
6	Three Mile Creek Area on lines A*, A and B	Very long linear anomaly (2000 feet in length) associated with S.P. and magnetic anomalies

Anomaly Number	Location	Remarks
7	Three Mile Creek Area on line B	Moderately intense geochem. anomaly associated with S.P. anomaly.
8 (a) 8 (b) 8 (c)	Bealey Creek District on lines R2	Small anomalies associated with S.P. "kicks" approx. 30 millivolts.

These sites are considered to be the most likely locations for nickel mineralisation.

Nickel geochemical anomalies are usually associated with marked cobalt geochemical anomalies.

The chief problem raised by the geochemical results is the marked low values for copper. Since copper cannot be accommodated in the lattice of serpentine, the presence of large copper values would unquestionably indicate copper mineralisation. The fact that the copper content of the soil is low must cast some doubt on the presence of copper sulphides in the area.

Summary

Several promising anomaly zones are detected (see appendix for geochem. map) in the areas studied. These zones trend in a roughly N-S direction and are thus parallel to the regional foliation. Values for nickel of nearly 10,000 ppm. and of cobalt up to 2,400 ppm. are recorded from the anomaly zones. The average nickel concentration from the anomalies is 3,000 ppm. The anomalies are promising sites for sulphide mineralisation, although sulphides are not found at ground level.

(E) CONCLUSIONS & RECOMMENDATIONS

The copper/nickel potential of the Camp Thirty District is to a large extent hidden by a lateritic capping which may overly sulphide mineralised serpentinites. Nevertheless, several promising anomalies exist in which high nickel and cobalt values are obtained. These anomalies could quite possibly be produced by nickel bearing sulphide orebodies aligned parallel to the regional foliation in the serpentinite.

Recommendations for Further Work

Further work should be done in the area. It is suggested that this work assume two forms:

1. Further geochemical and geophysical investigation to define the boundaries of the established anomalies and also to define new anomalies. Approximately 11,000 ft. of linecutting and geochemical sampling should be conducted over anomalies 1-8. Geochemical assaying should be done for Cu, Ni, Co and As in an attempt to more accurately define anomalous zones.

2. Further fieldwork and limited geophysics and geochemistry be conducted over the basic igneous rocks along the western contact.

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REFERENCE OF MAPS AND DIAGRAMS

C68-1	Geological map for Merton Area and Camp 30 Area.
C68-2	Locality map for Merton and Camp 30.
C68-3	Locality map for cut lines in Camp 30 Area. Also shows major S.P. anomalies.
C68-4	Geochemical contour map for cobalt in Camp 30 Area.
C68-5	Geochemical contour map for copper in Camp 30 Area.
C68-6	Geochemical contour map for nickel in Camp 30 Area.
C68-7	Geochemical contour map for cobalt in Merton Area.
C68-8	Geochemical contour map for copper in Merton Area.
C68-9	Geochemical contour map for nickel in Merton Area.
C68-10	Magnetometer traverses along connecting lines A*, A, R2 & connecting line from R2 to R7 - Camp 30 Area.
C68-11	Magnetometer traverses R4, R5, R6, R7, R8, R9, R10 & connecting base line - Camp 30 Area.
C68-12	Self Potential traverses A*, A, B, D, E, A1, A2 & A3 - Camp 30 Area.
C68-13	Self Potential traverses R1, R2, R3, connecting lines, continuation R2, R12, connection R2 to R7, R4, R5, R6, R7, R8, R9, R10 & R11 - Camp 30 Area.
C68-14	All S.P. traverses for Merton Area.
C68-15	Geochemical traverse profiles A*, A, B, D, E, A1, A2, A3 & C - Camp 30 Area.
C68-16	Geochemical traverse profiles R1, R2, R3, R11, R2 cont. - Camp 30 Area.
C68-17	Geochemical traverse profiles R4, R5, R6, R7, R8, R9, R10 - Camp 30 Area.
C68-18	Geochemical traverse profiles - Merton Area.

NB: ALL MAPS & DIAGRAMS MISSING

An index to transparencies that
may be referred to in this report
will be found in -
TCR 85-2425
TCR 85-2427
TCR 85-2428