Report on Regional Geology
Summer 1965-1966
(Waratah, Mt. Cleveland, Mt. Lindsay)

By D.M. Ransom
C.J.L. Wilson

214002 66-445 Q43/31

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

505 ST. KILDA ROAD, MELBOURNE, S.C.2, VICTORIA

YOUR REFERENCE
OUR REFERENCE

TELEGRAMS "ABMANGE" MELBOURNE
TELEPHONE 26 4511

July 29, 1966

The Director of Mines,
Mines Department,
Box 125 B, G.P.O.
HOBART, TASMANIA.

4470/66

Dear Sir,

Re. E.L's 2/63 (Mt. Lindsay) and 29/65 (Yellowband)

I wish to advise that no field work is being conducted on the above mentioned licences at the present time due to the great difficulty in maintaining lines of communication in the area. It is anticipated that it would be November before further work could be undertaken and, subject to renewals, it would be appreciated if you could grant us a suspension of the conditions of work.

I cannot determine from our records whether we provided you with a copy of the Report on Regional Geology, Summer 1965-66 but in any case a copy is attached hereto together with a print of the reference map.

Since the field work was completed and the report written, petrological studies on collected specimens have been carried out at the Sydney University and a copy of a petrological report is also attached hereto. The location from which the specimens were gathered are shown on the reference map.

Also attached hereto are verified statements of expenditure relating to the above licences, up to May 31, 1966.

Yours faithfully,
ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

A. Mason

(A.A.C. Mason)
Manager

OPEN FILE

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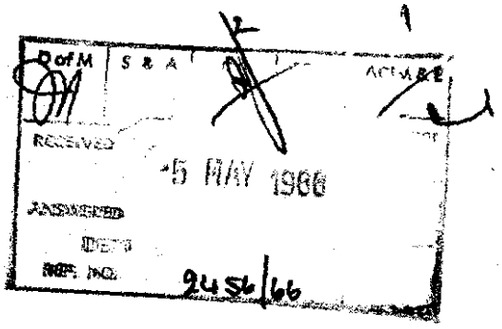

REPORT ON REGIONAL GEOLOGY.

SUMMER 1965 - 1966.

(WARATAH, MT. CLEVELAND, MT. LINDSAY AREAS.)

By.... D.M. Ransom
And.... C.J.L. Wilson.

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

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1. STRATIGRAPHY OF CAMBRIAN (?) SEDIMENTS.

(A) North of Meredith Granite (near 5 mile camp)

From the Corinna Road to the granite contact on the Yellowband Track basic volcanics outcrop near continously. From approximately the position of anomaly 52 to the granite contact volcanics distinct from those at Mt. Cleveland occur. These are coarse grained tuffs and breccias which apparently grade into the finer grained volcanics and tuff-cherts to the west of anomaly 52 and also at the head of Falls Creek. Chocolate and Khaki shale occur about a half mile west of the position of anomaly 52, apparently accounting for anomaly 54. Assuming a north- easterly strike it may be possible to pick up the contact of these beds in one of the side creeks of Falls Creek. Since the finer grained volcanics of the Footwall Formation is the highest unit of the Crescent Spur Group, the coarser grained volcanics occuring to the north of the granite in this area may be slightly higher in the sequence than the rocks at Mt. Cleveland. No micaceous sandstone was observed in this area, suggesting that no extension of the base of the sequence at Cleveland occurs.

(B) South of Wombat Flat. (On Ramsay Track)

A smallbelt of fine grained Cambrian (?) Volcanics lie between granite on the west and basalt on the east. These volcanics are fine grained, well jointed, with the sequence being dominated by fine grained igneous rocks and finely bedded tuffs similar to the sequence at Cleveland mine.

The boundary between this sequence and the basalt is difficult to locate, but this latter rock is generally coarser grained, pophyritic in plagioclase and contains amygdales infilled with calcite and quartz. The finer grained volcanics have metamorphosed to a minor extent by the granite, which in hand specimens are distinguished by a patchy development of massive amphibole and small veins of fibrous amphibole.

Because of the lack of other characteristic lithologies, these rocks cannot be correlated directly with the sequence at Cleveland mine, but on lithological similarities these rocks appear to be similar in many respects to the footwall volcanics. For this reason they have tentatively

been/

been assigned as members of the Cambrian sequence found at Cleveland

(C) South of Meredith Granite (Parsons Hood and Mt. Lindsay).

A brief examination of the rocks in this area was made while investigating anomalies 65 and 67. A traverse down Tulloch Creek revealed interbedded fine grained and medium grained volcanics and grey tuffaceous chert to a position a quarter of a mile from Salmon Creek where chocolate coloured tuffs and shales outcropped. These rocks extended east along Salmon Creek to near the junction with South-east Creek. From here to the Wilson River along Salmon Creek the grey blue volcanics and cherts outcropped. In the vicinity of anomaly 65 fine to meduim grained volcanics occurred with little or no chert. South of the granite contact near anomaly 67, the same lithologies occurred apparently extending to the Mt. Lindsay- Stanley Camp track.

On the track from Mt. Lindsay across Parsons Hood to the Harman River fine to medium grained volcanics occurred to a point about half way down Parsons Hood. The volcanics then became considerably coarser grained, and these coarser volcanics, still associated with the finer volcanics, extended to the contact with the serpentinite in the Harman River.

Grey cherts and volcanics outcropped in the Wilson River near the contact with the serpentinite. It appears that in this area, therefore, blue grey volcanics with minor chocolate shales and associated rocks are dominant. There is a marked superficial resemblance between the cherts and volcanics with the finer grained volcanics occurring to the north of the granite and at Mt. Cleveland. The chocolate coloured volcanics and shales are generally coarser than those at Cleveland, but appear very similar in handspecimen to the chocolate coloured rocks near the old Mt. Magnet workings, especially those near the Magnet Dam, (anomaly 60).

(D) Lithological Correlation with the Cambrian Sediments of the Renison Bell and Dundas Areas.

Reid (1918) correlated the older sediments in the area from Mt. Cleveland to Mt. Bischoff with the Dundas "Series", and they were previously termed the Magnet Range Group (or formation). His criteria are presumably lithological because these rocks are completely unfossiliferous.

Banks (1962) in the "Geology of Tasmania" notes that sediments in the Waratah area are similar to those in the Huskisson River and at Dundas.

The//

The sediments in the latter area are termed the Crimson Creek Formation and the Huskisson Group. The Crimson Creek Formation is unfossiliferous while the Huskisson Group is dated as Lower to Middle Cambrian by a trilobite fauna and is correlated with the Dundas Group, apparently equivalent rocks in the Dundas area. On the Huskisson River, where the Crimson Creek Formation was originally defined, the above two units are separated by a belt of serpentinite. On the Huskisson River the serpentinite in sill-like, according to Blissett (1960 and 1962), who states also that the Huskisson group lies concordantly on the Crimson Creek Formation, the two units being conformable. The fact that the belt of serpentinite separates the fossiliferous Huskisson Group from the un-fossiliferous Crimson Creek Formation is a remarkable coincidence. A similar intrusion occurs at Zeehan near the base of the Dundas Group. Apparently on the assumption that the Crimson Creek Formation is thus conformable at Zeehan and Heemskirk, the beds occurring below the Dundas Group or below the fossil horizons are termed the Crimson Creek Formation. If the writer is correct in interpreting Blissett's report as above, the Crimson Creek Formation and the Dundas Group have not been proven to be conformable because in the type areas of the Huskisson River and at Dundas the respective formations are never in actual contact with one another. It would appear that a structural break of some kind occurs between them.

On Riotinto's map the Crimson Creek Formation is apparently undifferentiated from the rocks occurring at Mt. Lindsay and surrounding areas. Blissett notes that this formation on the Huskisson River is chocolate coloured mudstone, greywacke, overlain by monotonous red, purple and grey mudstone. Volcanics are almost totally absent. This lithology is in complete contrast to the rocks on Mt. Lindsay and on Parsons Hood, where basic volcanics dominate the sequence. Hence little or no correlation can be made on litholigical grounds. It seems to the writer that a greater similarity exists between the Cleveland-Waratah area and Mt. Lindsay than between Mt. Lindsay and the type area of the Crimson Creek Formation.

(E) Conclusion.

The writers suggest that no positive correlation between the sequences at Mt. Lindsay and Mt. Cleveland can be made with the Cambrian type sequences in the Huskisson-Pieman area and at Dundas, until the relationship of the rocks at Mt. Lindsay has been determined with more detailed geology in the intervening area A traverse down the Wilson River could conceiveably

clarify/

clarify this relationship.

From the present writers observation it is suggested that the Mt. Lindsay- Cleveland sequence may represent a facies change within the Crimson Creek Formation from volcanic argillites at Renison Bell to include lavas at Lindsay and Cleveland. Also the writers suggest that the stratigraphic relationship between the Crimson Creek formation and the Dundas Group is uncertain for the reasons given above.

The rocks at Mt. Lindsay have a superficially stronger resemblance to those at Mt. Cleveland than to those on the Huskisson River, and may be in a similar position in the sequence, in both areas. The lithological correlation is purely tentative, considering the brief investigation of both areas undertaken by the writers.

2. THE SERPENTINE ROCKS.

(A) The Harman- Wilson River Area.

A distinct belt of serpentinite rocks can be mapped from aerial photographs and easily traced in the field which extend from the granite contact on the Harman River to south of the large bend near the mouth of the Huskisson River.

Blissett (1962) and Banks (1962) indicate that this and other associated ultrabasics in the region are sill-like in character and often foliated. On the Huskisson River Blissett states that "both the base and the top have chilled margins and the surrounding sediments have been altered to chert or hornfels".

On the ridge separating the Harman and Wilson Rivers the foliation in the serpentinite is vertical or near vertical striking 330. Three fairly distinct types of foliation were recognised:

(i) a layering defined by ridges on extensive weathered outcrops in the Harman River west of the plain. On fresh surfaces this foliation cannot be observed, the rock appearing completely massive. This layering resembles bedding closely since it is of consistent thickness and attitude over distances of up to 50 feet. However its softness and the presence of fibrous amphiboles suggest that it is part of the serpentinite. It differs quite markedly from the adjacent basic volcanics on Parsons Hood.

(ii) A locally developed foliation defined by the presence or absence of haematite rhombs in layers is well developed south of the first Harman Camp. It is best seen on weathered surfaces although it can be seen on frest specimens.

(iii) A layering defined by lensoid masses of chalcedony observed on the ridge to the east of the plain.

A parting is commonly observed in the plain which is irregular in attitude, from vertical to horizontal. This is not a compositional layering, and may be caused by spheroidal weathering of the serpentinite.

On the ridge over which the track from the second Harman Camp to the Wilson Camp was cut, a wide mass of gossan occurs over about 250 yards on the flat part of the ridge. This appears to be reprecipitated haematite, since it is composed of pellets of limonite about 5mm across. No truly crystalline haematite aggregates were observed, although small masses of haematite were found throughout the area. Speciments have been collected at localities across this ridge and thin sections will be cut.

In/

In the course of investigation of anomaly 29, the section of the Serpentinite exposed in the Wilson River where it swings sharply west (about 1½ miles south of the Wilson River camp) was mapped.

From the eastern contact, where the serpentinite is covered by Ordovician quartzite to the western boundary which is a fault contact three fairly distinct zones can be mapped (see sketch map):

(i) A layering phase: the layering defined by a fine dark coloured mineral, individual folia being 2 or 3mm. apart. This is apparently separated by a fault (strike 310, vertical) from

(ii) Massive phase: not layered, which grades into

(iii) Massive phase: containing haematite rhombs. The layering observed near the Harman Camp defined by haematite not being present. This phase extends to the western boundary.

A major fault zone, about 200 yards wide, striking 305, with a vertical foliation and vertical slickensides, outcrops in the large meander and changes the course of the river. Faults of similar attitude occur throughout the section.

Fibrous amphibole is prevalent throughout phases (ii) and (iii). The veins are usually about 10mm. apart and up to 2mm. thick. (Near the first Harman camp veins up to 3mm. thick have been observed). Actual amphibolite was observed as boulders.

Near the western contact of the serpentinite on the Wilson (corresponding to the change of vegetation and the large bend to the south of the river). The serpentinite at this point becomes markedly schistose, hence it is suggested that the contact with the cherts and volcanics is a fault boundary.

(B). <u>Huskisson River - Merton Creek Area.</u>

The serpentinite in this area belongs to the much larger belt extending to the Harman River. Three main types of serpentinite may be recognised.

(i) A layered phase found on the eastern margin along Merton creek, this layering being superimposed on the serpentinite by a series of major faults. In the vicinity of the Merton Creek anomaly on the boundary of the serpentinite belt is a series of layered boulders of alternating layers of course and fine grained orthopyroxene.

(ii) A foliated phase with a subhorizontal compositional layering which is gently folded into very open folds.

(iii) Massive serpentinite with no foliation and may be very well jointed/

jointed and is intersected by veins of amphibolite. This massive phase may also contain small rhombs of heamatite.

The massive phase of the serpentinite is generally associated with cappings of iron oxide mainly in the form of redeposited heamatite and limonite. The main deposit occurs in the vicinity of 3 mile creek where the iron oxide body extends for 3/4 of a mile in an east west direction. The iron ore has associated with it local magnetic anomolies in the order of 4000 to 7000(γ) which tends to suggest that there may be a large concentration of magnetitite or chromite in small localised lenses within the serpentinite body, part or all of which have been redeposited on the surface as a lateritic capping as seen in three mile creek where the heamatite is some 15 feet thick and rests on massive serpentinite.

(C) Merton Hill.

This consists of both massive serpentinite and coarsely crystalline orthopyroxene, no structural relationship between the two types was observed, and it is presumed the orthopyroxene probably represents the original intrusion which has subsequently been altered serpentine.

Associated with the serpentinite is a small deposit of redeposited heamatite and limonite.

(D) On Track to Five Mile Creek.

This consists of a narrow belt extending from the Corinna road to anomaly 53. It is generally massive but contains an almost vertical foliation. In the vicinity of anomaly 53 the serpentinite has been contact matamorphosed resulting in the development of talc rosettes.

(E) Conclusions

The general character of the serpentinite appears to vary markedly from location to location. Different phases do not appear to extend very far. It is conveiveable that the serpentinite represents a differentiated intrusion of the peridotite or pyroxemite type, which since intrusion has been folded and faulted resulting in a marked variation in the orientation of the original compositional layering. The gossanous areas of iron oxide probably represent cappings derived from an iron oxide rich phase within the original intrusion. The most extensive gossanous areas lay on the flat areas on the top of the ridge between the Harman and Wilson Rivers and between Huskisson and Three Mile Creek.

3. ORDOVICIAN - DEVONIAN SEQUENCE.

A synclinal sequence of Ordovician & Devonian sediments dominates the south eastern portion of the area investigated. The ordovician rocks in the area are the Mt. Zeehan conglomerates occurring in the west at anomoly 28, and the Gordon Limestone in the Huskisson River below anomaly 44. The boundary between the Devonian sequence and the serpentinite in Merton Creek appears to be a fault boundary with sheared serpentinite adjacent to the undeformed quartzsize.

The trough appears to be dominated by Devonian ← SILURIAN sediments which were encountered in two principal areas.

(i) On the Wilson River one mile south of the Yellowband River, and also to the east of the Wilson Camp. At the former locality the sequence consists of well bedded quartzites, sandstones, marls and quartzites containing lenticular shale partings which dip at approximately 80° to the east. Bedding is generally no more than two inches thick and may contain quite distinct laminations. The rocks in the area have been metamorphosed by the Meredith Granite resulting in minor recrystallization of the quartzites and the development of garnet hornfels from the marls which are interbedded with the quartzites.

East of the Wilson River camp the Devonian - Silurian sequence is generally similar to the above, but lacks any metamorphic effects.

(ii) The Merton Creek Area.

The sequence here consists mainly of steeply dipping sandstones and quartzsites. The quartzite varies from a pure white siliceous rock to a quartzite containing numerout shale partings. At the base of this particular section is approximately 50 feet of grey shale which in certain horizons contain small quantities of syngenetic pyrite.

4. THE MEREDITH GRANITE.

The granite contact was examined on the Harman River near the first camp, and was mapped from Parsons Hood to the Little Wilson River.

A silicified zone about 25 - 40 yards wide separates the granite from the massive serpentinites. In this zone finely divided sulphide mineralization was observed in one place in the Harman River, the sulphides being pyrite and possible chalcopyrite. No easily recogniseable contact metamorphism apart from weakly developed talc and occasional veins of fibrous amphibole was recognised. The fibrous amphibole in veins up to an inch in thickness in some places. Talc rosettes were observed further south from the granite contact.

A flow foliation defined by coarse and fine grained phases dips shallowly in the region of the contact, suggesting perhaps that the granite is shallowly dipping on this contact. Foliation of similar attitude can be observed across the granite plain from the Yellowband Creek to the Harman River.

There is a notable absence of xenoliths in this part of the granite, although occasional xenoliths have been observed in other localities, e.g. near the Five Mile Camp. West of the Yellowband Camp on the granite plain nodules of tourmaline are fairly common. These nodules appear similar in many respects to xenoliths. Tourmaline in this granite is thought to be pneumatolytic in origin (cf. Reid) and late stage, but the tourmaline in nodules could conceiveably crystallize from the melt, since they do not appear to be associated with any veining in this type of occurrence.

The granite contact with the devonian sediments on the Wilson River, (1 mile south of junction with Yellowband River) was a fine grained phase of both quartz-feldspar and quartz-biotite-feldspar granite, which upstream grades into a coarse grained phase, grain size approx. 0.5 to 1cm. across, transgressed by aphitic dykes verging from 3" to 3' in width. No flow foliation, an absence of zenoliths and no signs of mineralization (sulphide) are associated with any phase of the granite in this region.

Contact metamorphism of the Devonian sequence on the Wilson River has resulted in the development of garnet and quartzites which contain a very fine film of chalcopyrite on the freshly broken joint surfaces and finely dissiminated pyrrhotite throughout the rock or concentrated along a bedding fissility or quartz veins with small amounts of epidote.

The granite/

The granite on the Mt. Ramsay track is generallyporphyritic in Orthoclase but also contains brolite rich phases. Mineralization within the granite in the Ramsay area appears to be controlled by jointing. Mineralization was observed except for tourmaline nodules and iron oxide zones along the prominant joint surfaces in the granite which in this particular area trends due north and dips at 60° to the west.

In the case of Cundy's Mine an addit has been driven along a greisen dyke which follows the joint directions. The dyke is extremely rich in muscovite, lepidolite tourmaline and chlorite. A discription of this rock will accompany the petrological report.

Apart from the occasional tourmaline rich phases, fine grained phases, and porphyritic phases the granite is generally a massive coarse grained rock, consisting of plagioclase (dominant), orthoclase, quartz and biotite, which may be noticeably green in colour.

Tourmaline occurs as ;

1. quartz-tourmaline nodules
2. as veins parallel to joint directions.
3. In pigmatite with large quartz grains.
4. Replacing plagioclase phenocrysts.

SUMMARY OR GEOLOGY OF AEROMAGNETIC ANOMALIES.

1. Anomaly 24.

Location: 2½ miles south of Yellowband track, four miles from the Corinna Road.

Area covered by low lying swamp ground. No outcrop, the soil is a granite sand, the rock type in the area is suspected to be granite.

2. Ahomaly 25.

Location. On Johnson Creek, 1½ miles east of junction with Moore Creek.

No outcrop observed except for a few pebbles of chocolate shale and chert lying within a thick cover of soil and a number of pebbles of volcanics at the top of the hill adjacent to the anomaly.

The rocks in this area, until further work is carried out, may be tentatively correlated with the Cleveland sequence.

3. Anomaly 26.

Location: About 2 miles west of the Yellowband Creek Camp.

Anomaly occurred in tourmaline-rich phase of the granite. Tournaline mineralization was extremely common in veins, nodules and pegmatite.

4. Anomaly 28.

Location: 1½ miles north of Huskisson and Pieman River Junction.

The anomaly lies within the Ordovician Mt. Zeehan conglomerate adjacent to the junction of the north - south trending serpentinite body. No gossamous areas or other signs of mineralization were found in the area. The anomaly may be purely a function of the serpentinite or a result of a subsurface body of iron and/ or chromium oxide body in the differentiated serpentinite body.

5. Anomaly 29.

Location: 200 yards south of Wilson River, 1½ miles south of the site of the present Wilson Camp.

Anomaly occurred in massive serpentinite, with occasional patches of reprecibpitated haematite in the vicinity. No true outcrop of gossan occurred, so it is suggested that it represents a capping.

6. Anomaly 30.

Location: On the divide separating Osmiridium Creek from Three Mile and Riley's Creeks, approximately 1 mile north-east of the Pieman and Riley Creek Junction.

The anomaly is similar to 29 occurring in massive serpentinite with a soil capping rich in beamatite and limonite. There was no marked response when traversed with the magnetometer.

To the west of anomaly 30 is a large belt of redeposited heamatite and limonite with its extension parallel to Three Mile Creek. In Three Mile Creek the body appears to be a lateritic capping some 15 feet thick and has associated with it a magnetic anomaly of some 4000γ. The main portion of the iron body varies markedly in magnetic intensity (i.e. traversed north-south) varying from 3000 to 7000 γ .

7. Merton Creek Anomly.

Location: At the headwaters of Merton Creek one mile south-east of anomaly 29.

The anomaly is caused by gossanous outcrop of redeposited heamatite and limonite on the junction between serpentinites (or north) and quartzite (south). A traverse with a magnetometer across the gossanous area indicated a maximum anomaly of 5000γ which passed into the quartzite. The quartzite is generally impregnated with heamatite and limonite, which steadily decreases away from the contact. (see accompanying figures)

8. Anomaly 31.

Location: In plain near harman River.

Similar to 29, occurring in massive serpentinite.

9. Anomaly 44.

Location: At merton Hill on the huskisson River.

Serpentinite and coarsely crystalline Orthopyroxene rocks make up Merton Hill. The anomaly appears to be caused by a small body of redeposited Heamatite and Limonite lying within the serpentinite and some of the alluvium from the Huskisson River. It is suggested that this deposit may have been derived from an unexposed magnetite-chromite body.

10. Anomaly 47.

Location: One mile down Wombat creek from junction of the Ramsay and South Bischoff tracks.

This anomaly appears to be on the contact between the folded Cambrian basic volcanic sequence and the flat lying tertiary basalt.

11. Anomaly 48.

Location: One mile south of the Corinna road and 1½ miles east of the Ramsay Track.

This anomaly appears to be within Tertiary Basalt. The exact position of the anomaly was not reached, but basalt lies within a quarter of a mile on the east, west and northern sides of the anomaly.

12. Anomaly 51.

Location: On the Corinna Road east of Magnet 6 mile dam.

The anomaly is caused by Tertiary Basalt.

13. Anomaly 52.

Location: Three miles down the Yellowband Track from the Corinna Road.

Basic volcanics (fine grained) apparently with authigenic pyrite and a small plug of diorite occur to the east of the road. A gossanous material was found outcropping a few feet off the road and on one of the ground magnetic traverse lines, containing limonite and green quartz. To the west of the track coarser volcanics occurred. No anomaly was picked up over the gossan, but a large anomaly occurred to the west and east of the track. The western anomaly may be on the chocolate shale which occur about 1000 feet west of the road.

14. Anomaly 54.

Location: A half mile north-west of anomaly 52.

Chocolate and khaki shales probably occur at the location of this anomaly. The boundary of these rocks with the volcanics of anomaly 52 can be roughly located by distribution of pebbles, but little outcrop occurs.

15. Anomaly 53.

Location: 200 yards north of Moore Creek, about 1½ miles east-south-east of the five Mile Camp.

The anomaly occurred in a tourmaline-rich phase of the granite. The tourmaline occurred as nodules together with large quartz crystals as a thin veneer, on joint cracks within coarse grained granite.

To the west of the anomaly is a belt of serpentinite which has suffered extensive contact metamorphism resulting in the development of a rock rich in talc and anthophyllite(?)

It is thought that the anomaly is a contact effect between the serpentinite and the granite.

16. Anomaly 61.

Location: A quarter mile west if the Mt. Magnet workings.

No mineralization was observed, the anomaly occurring in chocolate shales and feldspathic sandstone of a similar colour. The rocks are generally coarser than those at Mt. Cleveland, and less massive, bedding structures being quite common.

17. Anomaly 60.

Location: On the edge of the Mt. Magnet Dam.

In a lithology similar to that of anomaly 61, with a strike of about 260. A small gossan of sulphide mineralization occurred on the site of the anomaly, associated with quartz calcite.

18. Anomaly 67.

Location: Three quarters of a mile west of the Mt. Lindsay heliport.

Anomaly occurred in tourmaline rich phase of the granite, about 200 years south of the contact. The country rocks were fine grained volcanics. The tourmaline occurred as aggregates replacing the feldspar in the granite.

19. Anomaly 65.

Location: In South-east Creek, about three quarters south-east of the Mt. Lindsay camp.

Anomaly occurred in fine to medium grained volcanics with a small amount of chert. In Tullock Creek on the same anomaly, mineralization was found in grey chert, the mineralization being chalcopyrite and pyrite. No mineralization was observed in South-east Creek, but outcrop was poor.

20. Anomaly 64.

Location: On the Whyte River to the west of the Magnet Mine.

The positioning of this anomaly is not definite. The anomaly appears to occur on the junction of volcanics and shale, which contain numerous slickensides as though the junction is a fault zone.

21. Anomaly 46.

Location: Two miles S.S.E. of the Mt. Ramsay and South Bischaff tracks junction.

The anomaly is located within Tertiary Basalt where there is apparently no signs of mineralization.

Within the highly folded sequence adjacent to Anomalies 46 and 47 there/

there is evidence of chalcopyrite mineralization mainly along quartz veins and in joint cracks, while on the waterfall to the east of Anomaly 46 there are beds of interbedded sandstone and shale. These latter beds contain minor mineralization and may necessitate further follow up work.

CONCLUSIONS.

Of the anomalies examines by the writers, 25, 54, 61,60, and 46 would appear to be the most promising since they occur in lithologies in which mineralization has been found in economic quantities. That is, they occur in rocks of a type similar to those of the Lode Bed Formation at Mt. Cleveland.

Anomalies 62 and 63 appear to lie within the belt of Cambrian sediments between Cleveland and the Magnet Mine, but further work on these has to be carried out by E. Eshuys, together with anomaly 46.

The heamatite bodies of anomaly 44, Merton and the Three Mile Creek area may also prove to be of economic potential.

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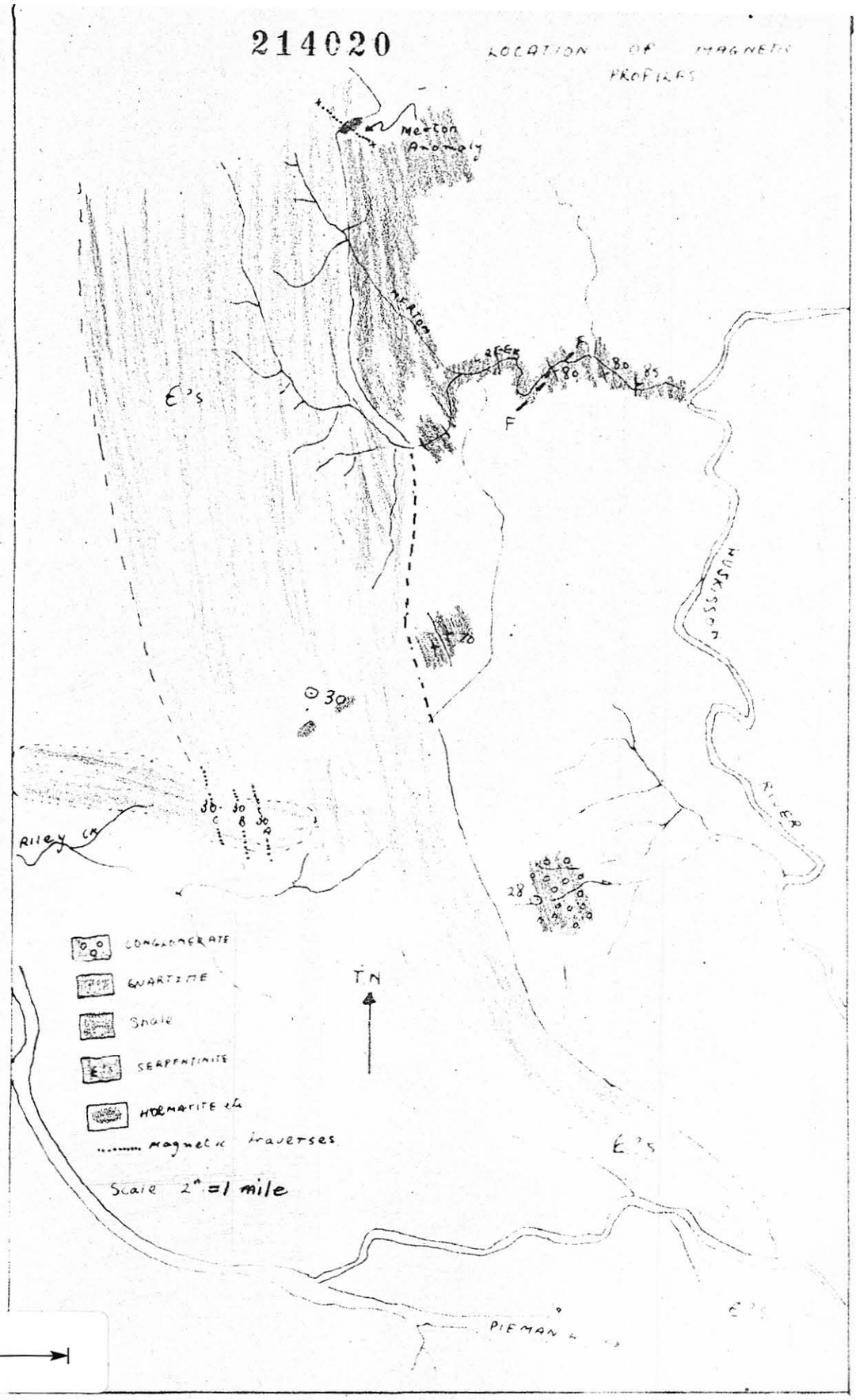

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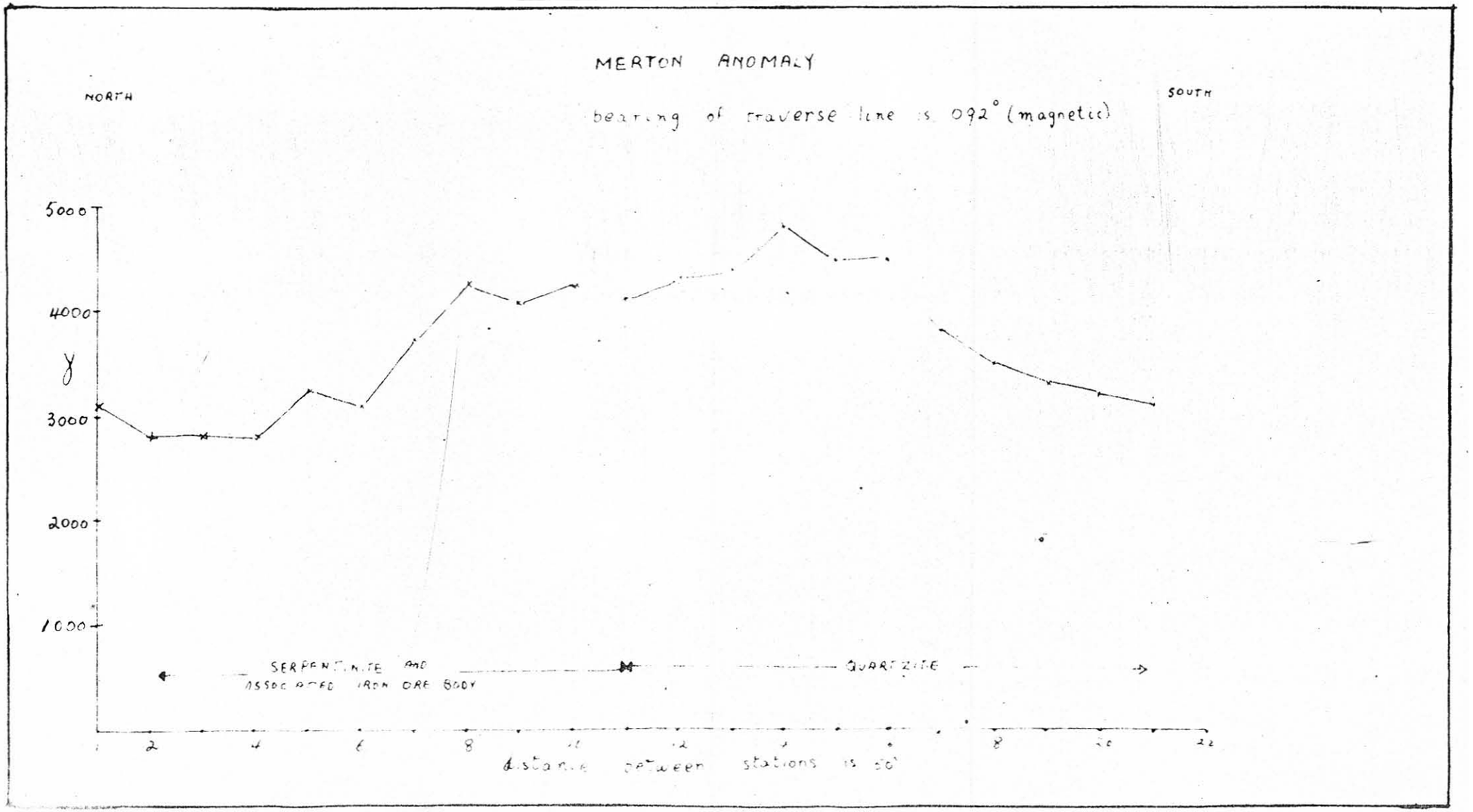
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3000
2000
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SERPENTINITE AND
ASSOCIATED IRON ORE BODY
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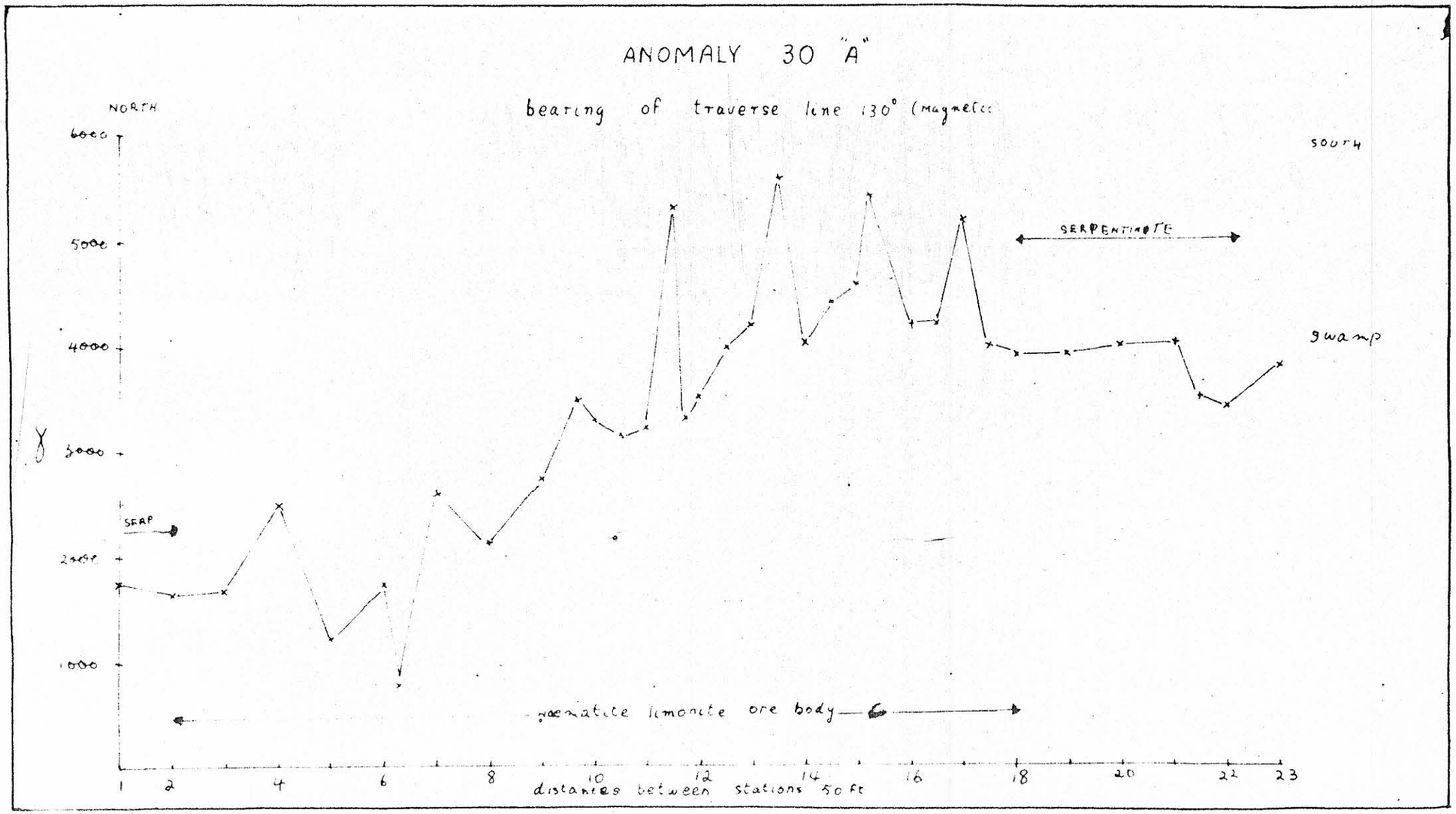
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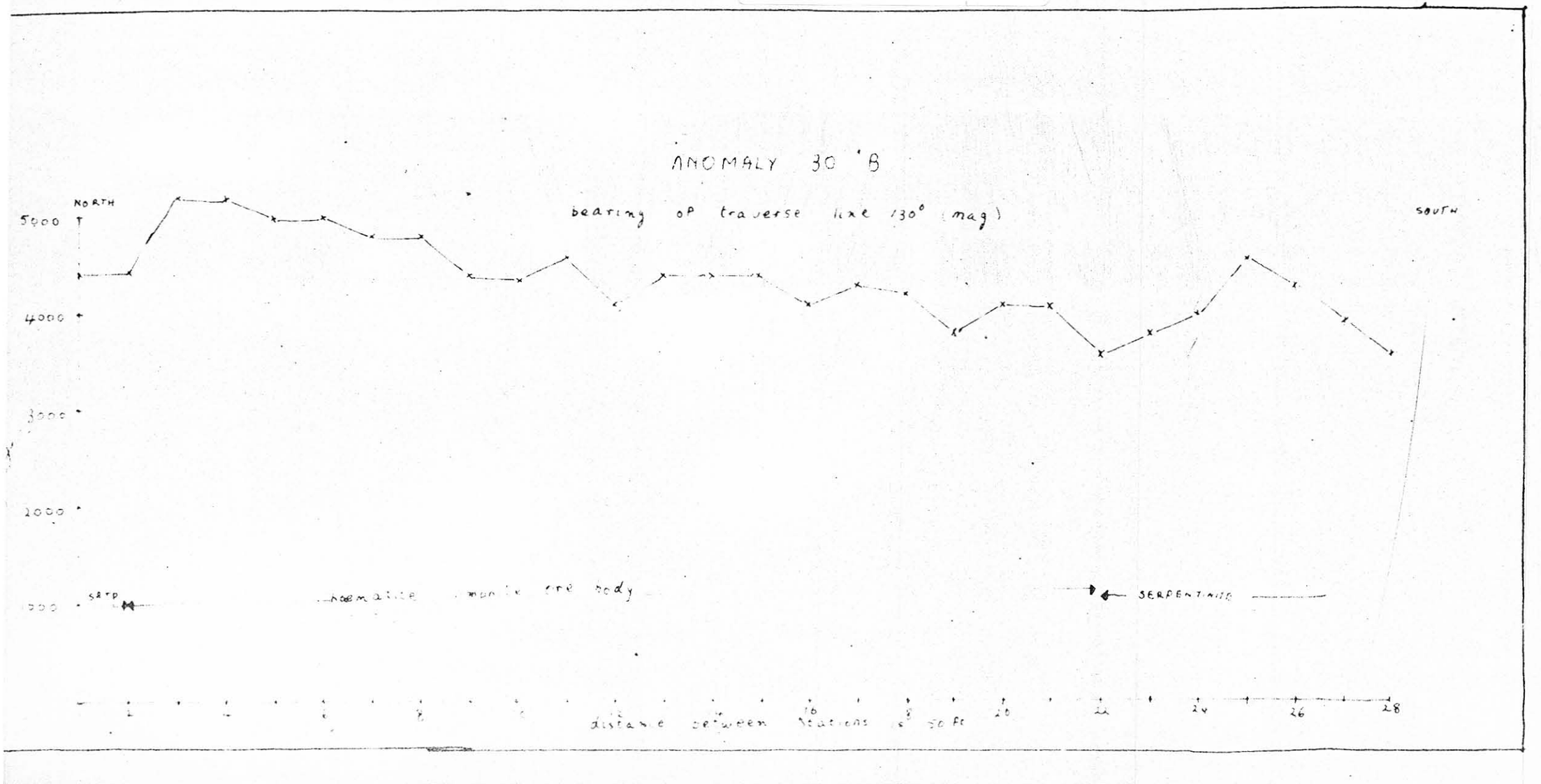
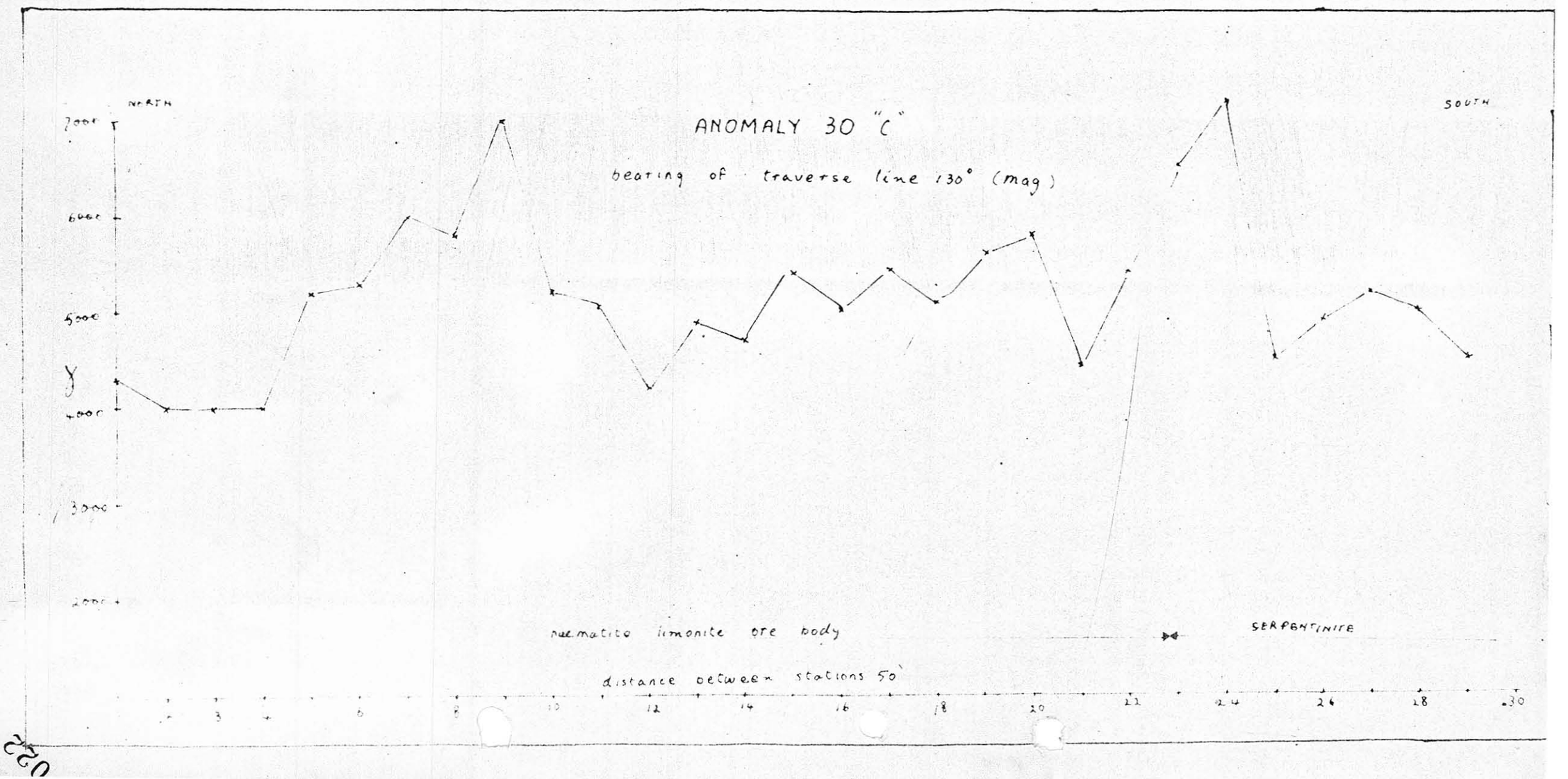

ANOMALY 30 'B
bearing of traverse line 130° (mag)
NORTH
SOUTH
5000
4000
3000
2000
1000
SERP
SERPENTINITE
2
4
6
8
10
12
14
16
18
20
22
24
26
28

2140 24

5 cm


NORTH
SOUTH
7000
6000
5000
4000
3000
2000
ANOMALY 30 "C"
bearing of traverse line 130° (mag)
Y
hematite limonite ore body
SERPENTINITE
distance between stations 50'
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

023

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP 22 1967

ANALYSIS OF EXPENDITURE ON Mt. Lindsay PROSPECT

FOR MONTH ENDING May 31 1966

214025

A/C. NO.		M/E $	M/E ¢	Cumulative Expenditure $	Cumulative Expenditure ¢
1.	Technical Salaries and Wages	599		93776	
3.	Sampling			173	
4.	Wages			19497	
5.	Outside Technical Services			6230	
6.	Geological Mapping			1408	
7.	Travelling - Accomodation			4899	
8.	" " Advance			65	
11.	Contact Drilling			51528	
12.	Bulldozing				
13.	Assaying and Sampling			415	
15.	Ore Dressing Investigation				
16.	Dredge Option Payments				
21.	Drafting			2641	
[illegible].	Plant Maintenance			286	
23.	Motor Vehicle Expenses			2102	
24.	Stores			13570	
25.	Freight			445	
26.	Plant Hire			2349	
27.	Surveying			2415	
28.	Power			40	
31.	Expenditure on leases, deposits, rents			1566	
32.	Rates			57	
33.	Road Construction			857	
34.	Heliport Construction			9601	
35.	Imprest Account Suspense				
36.	Airborne Magnetometer survey			4320	
41.	H.O. Overhead - Admin. & Secretarial			6350	
42.	Printing & Stationery			872	
43.	Communications			1560	
44.	General Expenses			560	
45.	Legal Expenses			4	
46.	Insurance			780	
47.	Bank Charges			113	
48.	Group Tax				
49.	Pay Roll Tax			785	
65.	Sundry Debtors				
50.	Bonus Payments				
51.	Management Fees	63		2876	
55.	Audit Fees			180	
59.	Superannuation			97	
71.	Plant and Equipment			624	
72.	Plant Motor Vehicle			3272	
73.	Furniture - Fittings				
70.	Lease Option Payments				
		662		155039	

I hereby declare that, to the best of my knowledge, the following represents a true and reasonable apportionment of the expenditure on Mount Lindsay EL 2/63 to May 31, 1966.

024

214026

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

ANALYSIS OF EXPENDITURE ON WEST TAMAR PROSPECT

FOR MONTH ENDING May 31 1966

A/C. NO.		M/E $	M/E ¢	Cumulative Expenditure $	Cumulative Expenditure ¢
1.	Technical Salaries and Wages	705		1489	
3.	Sampling				
4.	Wages			6095	
5.	Outside Technical Services			220	
6.	Geological Mapping				
7.	Travelling - Accomodation			592	
8.	" " Advance				
11.	Contact Drilling				
12.	Bulldozing				
13.	Assaying and Sampling				
15.	Ore Dressing Investigation				
16.	Dredge Option Payments				
21.	Drafting				
?.	Plant Maintenance				
23.	Motor Vehicle Expenses				
24.	Stores			1126	
25.	Freight			✓	
26.	Plant Hire			✓	
27.	Surveying				
28.	Power			27	
31.	Expenditure on leases, deposits, rents			303	
32.	Rates			9	
33.	Road Construction				
34.	Heliport Construction				
35.	Imprest Account Suspense				
36.	Airborne Magnetometer survey			7790	
?.	H.O. Overhead - Admin. & Secretarial			334	
42.	Printing & Stationery			205	
43.	Communications			37	
44.	General Expenses			342	
45.	Legal Expenses				
46.	Insurance				
47.	Bank Charges			14	
48.	Group Tax				
49.	Pay Roll Tax			96	
65.	Sundry Debtors				
50.	Bonus Payments				
51.	Management Fees			707	
55.	Audit Fees				
59.	Superannuation				
71.	Plant and Equipment			13	
72.	Plant Motor Vehicle			81	
73.	Furniture - Fittings				
70.	Lease Option Payments				
		705		19789	

I hereby declare that, to the best of my knowledge, the following represents a true and reasonable apportionment of the expenditure on Yellowband EL 29/65 to May 31, 1966.

B R Davis

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

REGIONAL GEOLOGY

WARATAH, MT. CLEVELAND & MT. LINDSAY AREAS

SCALE OF MILES
½ 0 ½ 1
40 30 20 10 0 40 80
SCALE OF CHAINS
5 cm

- Tertiary Basalt.
- Ordovician-Silurian-Devonian Sequence.
- Meredith Granite.
- Cambrian (?) Sediments.
- Serpentinite and Pyroxenite.

SHEET 2
SHEET 1

- Geological Boundary.
- Approximate Geological Boundary.
- Approx. Geological Boundary from Air Photos and Trend of Strike.
- Track.
- Magnetic Anomaly and number.
- Specimen and number.
- Bedding.
- Compositional Layering.

GEOLOGY – D.M. RANSOM – SUMMER 1965-66
C.J.L. WILSON
E. ESHUYS
DRAWN – C.J.L. WILSON – 22-3-1966
TRACED – P. VAN AMSTEL – 2-8-1966

DRAWING No.- C-213-G
Sheet 1

214627 66-425

3454

SCALE OF MILES

½ 0 ½ 1

40 30 20 10 0 40 80

SCALE OF CHAINS

5 cm

Tb	Tertiary Basalt.
	Orovician - Silvrian - Devonian Sequence.
Dm	Meredith Granite.
Є	Cambrian (?) Sediments.
Є?s	Serpentinite and Pyroxenite.

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

REGIONAL GEOLOGY

WARATAH, MT. CLEVELAND & MT. LINDSAY AREAS

SHEET 2

SHEET 1

Geological Boundary.
Approximate Geological Boundary.
Approx. Geological Boundary from Air Photos and
Track. Trend of Strike.
46 Magnetic Anomaly and number.
A7 Specimen and number.
60 Bedding.
10 Compositional Layering.

GEOLOGY	- D.M.RANSOM	- SUMMER 1965-'66
	C.J.L.WILSON	
	E.ESHUYS	
DRAWN	- C.J.L.WILSON	- 22-3-1966
TRACED	- P.VAN AMSTEL	- 2-8-1966

DRAWING No.- C-213-G
Sheet 2

214028

43/32

214029

VOLUME. 2.

SUPPLEMENT TO

REPORT ON REGIONAL GEOLOGY

SUMMER 1965-1966

(Waratah, Mt. Cleveland, Mt. Lindsay Area).

By: C.J.L. WILSON.

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

001

214030

ROCK SPECIMENS DESCRIBED.

Unless otherwise stated all specimens were collected by C. Wilson and the numbers given are field numbers.

R.8	quartz orthoclase granite
R.9	orthoclase granite
R.15	Porphyritic orthoclase granite
R.4.	Biotite Granite
24A	Microgranite
R.17, R.18	Hydrothermally altered griesen
An63	Alkali syenite
52C	Hornblende syenite
25	Olivine Basalt
A7	Titan-augite basalt
R.2	Quartz Sandstone
R.3.	Micaceous shale
25A	Chert
61	Volcanic sandstone
24.3	Quartz Epidote Hornfels
24.5c	Quartz biotite hornfels.
R.R.12	Basic hornfels
R.R.8	Biotite Hornfels.
R.R.9	Biotite hornfels.
R.R.13	Hornblende hornfels
A.3	Biotite Hornfels
A.1	Biotite Pyroxene Hornfels
An65	Biotite Cordierite Hornfels
Mert 3	Layered Pyroxenite
H.W.1	Serpentinized Pyroxenite
H.W.2	Hornfelsed Pyroxenite
H.W.3	Serpentinized Pyroxenite
H.W.4a, H.W.4b	Talc hornfels
H.W.6	Foliated serpentinite
Mert 4	Foliated serpentinite
24B	Cummintonite hornfels.
65A	ACTINOLITE HORNFELS

It is suggested that any future regional investigation should take into account the zones of highest degree of contact metamorphism. It is in these areas that attention should be concentrated as the granite is probably in the form of a shallow intrusion and hence would have associated with it a high degree of metamorphism. It would be in such a region that mineralisation would be expected.

Jack and Groves[1]. in their report on portion of the area investigated did not describe any metamorphism, although a few of their mineral assemblages would suggest contact metamorphism.

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1. Jack R. & Groves, D.I. 1965 "Geology of the Mt. Meredith-Yellowband Creek Area." Tech. Rept. Tas. Dept. Mines No.9.

The Meredith Granite has been described by Jack and Groves as consisting of various phases of an adamelite, although true for certain phases of the granite there are other phases such as those in the Mt. Ramsay area which are true granites. The alkali feldspar content is 1/3 the total feldspar and there appear to be no extensive phenocrysts of oligoclase. The plagioclose in the granite specimens examined appears to be on the albite-oligoclase boundary and generally is not in the form of phenocrysts.

Porphyoitic and microgranitic types are present in the Mt. Ramsay area with phenocrysts of Orthoclase and Quartz set in a hypidomorphic granular groundmass which in addition to the above minerals also includes biotite and plagioclase.

R8 shows a well developed granophyric texture around the feldspar and quartz phenocrysts and there is a transition from this texture through large phases of alkali feldspar enclosing hieroglyphs of quartz to a normal granite texture. It seems probable that these intergrowths can be interpreted as a result of similaneous crystalisation of quartz and orthoclase feldspar. The other granite rocks sectioned appear to be porphyritic in orthoclase.

Incomplete hybridization may be the reason for the numerous occurrences of hornblende phenocrysts within the rock.

Metasomatism associated with the granite was not observed in the limited rocks adjacent to the intrusions studied, but to establish its presence a detailed study of the contact metamorphism of the margin is needed.

003

214032

SPECIMEN R8.

LOCATION: From near bridge on Wombat Creek one mile down the Mt. Ramsay track.

HAND SPECIMEN: This is a light pink to grey granite, porphyritic in orthoclase feldspar with some phenocrysts being up to 3 cm. in length and 0.8 cm. wide. It is medium to coarse grained and completely massive.

THIN SECTION: The approximate modal composition is:-

Quartz	- 60%
Plagioclase	- 12%
Orthoclase	- 25%
Biotite	- 12%
Hornblende	- 1%

The hornblende occurs as very fine anhedral crystal fragments approximately 0.2 mm. across. They may consist completely of a deep green phleochroic hornblende or they may show all stages of replacement to biotite. The biotite may occur as small irregular plates less than 0.01 mm. to rectangular books up to 0.8 mm. in length. It is generally deep brown and strongly phliochroic and contains remnants of relic hornblende as well as small irregular crystals of magnetite up to 0.02 mm. across.

Plagioclase feldspar generally occurs as enhedral crystals of up to 1.4 x 0.8 mm. They are generally well twinned and some show very thin outer zones of a more soda rich phase, their average composition is approximately An_7. Orthclose occurs both as large phenocrysts as noted in the handspecimen, but also as an interstitial mineral with the quartz. Both feldspars tend to be sericitized.

The quartz occurs as irregular grains approximately 0.9 mm. across and is generally associated with the orthoclose as the last minerals to crystallise out of the melt. In places small patches of graphic intergrowths of quartz and orthclose occur, both being in optical continuity. The quartz occurs as small blebs averaging 0.06 mm. across and are completely enclosed by the orthoclose.

The rock is a Quartz orthoclose Granite.

004

214033

SPECIMEN R.9.

LOCATION: From the Wombat Mine (1962) $\frac{3}{4}$ mile down Mt. Ramsay Track from the Corinna Road.

HANDSPECIMEN: This is a medium grained massive granite. It is light yellow-pink in colour with a greyish appearance because of the presence of biotite mica.

THIN SECTION: The approximate modal composition is:

Quartz	- 30%
Orthoclase	- 54%
Plagioclase	- 7%
Biotite	- 8%
Hornblende	- 1%

The hornblende is up to 0.2 mm. in length and 0.08 mm. in width, occurring as ragged deep green crystals and resorbed fragments which show all stages of alteration to a dark brown biotite. Biotite occurs as small plates varying from $\leq$ 0.05 mm. across and up to 2.4 mm. across and completely pseudomorph some hornblende crystals along the clearage directions. A number of the biotite crystals are also bent and fractured, especially the elongate grains.

The plagioclose has square outlines in some crystals up to 0.7 mm. but generally occurs as small elongate laths averaging 0.2 mm. x 0.05 mm. These laths are generally heavily sericitized and are enclosed either by plates of quartz or more commonly orthoclose.

The average size of the quartz is approximately 1mm across and this occurs as irregular plates between the larger orthoclose. These latter crystals generally average 2 mm. across and may be partly sericitized.

The rock is an orthoclase granite.

J05

214034

SPECIMEN R15.

LOCATION: Specimen from wall of upper addit at the South Bischoff mine, two miles along the Mt. Ramsay track from the Corinna Road.

HAND SPECIMEN. It is a medium grained massive pale coloured granite, porphyritic in rectangular crystals of orthoclose of up to 2 x 0.7 cm.

THIN SECTION: The approximate modal composition is:-

Orthoclase	- 50%
Quartz	- 30%
Plageoclase	- 13%
Biotite	- 6%
Hornblende	- 1%

The hornblende occurs as anhedral deep green fragments, which show boundaries which have been resorbed by the parent magma and also replacement along clearage directions by biotite mica. Their average size is approximately 0.15 mm. Biotite occurs as a replacement of the ragged hornblende and as distinct square and rectangular books averaging 0.5 mm. in length.

Plagioclase feldspar occurs as enhedral crystals up to 0.9 mm. and 0.5 mm. These are generally evenly distributed through the rock and tend to be partly sericitized in an uneven pattern. Orthoclase occurs as pockolitic crystals enclosing the biotite and plageoclose and is generally intergrown with the quartz, which has an average grain size of approximately 0.7 mm. There are no graphic intergrowths of quartz and orthoclose.

The rock is a porphyritic orthoclase granite.

006

214035

SPECIMEN R4

Location: Wombat Flat on the Mt. Ramsay track.

Hand Specimen: This is a fine grained light grey granite containing quite distinct plates of black biotite together with scattered phenocrysts of plagioclase up to 8 mm. x 3 mm. in size.

Thin Section: The rock has the approximate modal composition of:

Quartz	40%
Orthoclase	40%
Plagioclase	15%
Hornblende	1%
Biotite	4%

The quartz occurs as ragged interatitial grains up to 1.7 x 0.8 mm, but the average size is approximately 0.3 mm, but there is another finer phase of approximately 0.04 mm. across. Orthoclase is the principle feldspar and is distinguished from the plagioclase by absence of relic multiple twinning, for they have both been extensively sericitized.

The biotite varies from approximately 0.13 mm. in length for the greater proportion, to large books greater than 4 x 1.5 mm. wide. The biotite is deep brown and many of the smaller grains to be altered with the development of alternating chlorite biotite layers.

The hornblende appears to be of two types. The first in a light brown green phleochroic hornblende. It generally occurs as an aggregate of small grains or fragments varying from 0.9 mm to 1.2 mm. in diameter. These fragments are generally separated by orthoclase or they may be separated by a thin veneer of chlorite. These probably represent the first minerals to crystallise from the magma and have since been partially resorbed and fractured by the magma. Some of the aggregates are completely enclosed by biotite and are observed to be replaced by biotite.

The second hornblende are small aggregates of radiating grains of the colourless to greenish blue variety of hornblende, Parasite. These crystals are long and slender and are no more than 0.15 mm. in length.

Accessory minerals include a few small grains of magnetite generally in association with the hornblende and minor quantities of

The rock is a fine grained biotite granite.

007

214036

SPECIMEN 24A.

Location: East of Moore creek.

Hand Specimen: It is a fine grained light coloured rock which is speckled with small dark patches of biotite mica. The grain size is uniform and there is no obvious foliation.

Thin section: This is medium grained with a modal composition of:

Quartz	28%
Orthochase	65%
Plagioclase	5%
Biotite	2%

The orthoclase generally occurs as Anhedral to subhedral grains varying in size from 1.5 x 1 mm to 0.25 x 0.25 mm, and may possess quite distinct simple twins. Many of the grains have been partly sericitized with cloudy pink cores. The orthoclose appears to enclose the biotite mica and some of the quartz as pockolitic plates.

The biotite occurs as ragged plates varying from 0.7 x 0.4 mm. to 0.09 x 0.09 mm. This biotite is deep brown strongly phleochroic and in places has been altered to light green chlorite parallel to the clearage traces.

Plagioclase only occurs as small grains, 0.1 mm, with strong multiple twinning. There have also been sericitized and possess cores of white mica. The quartz is interstitial. and occurs as irregular grains with the approximate grain size varying from 0.3 x 0.3 to 0.7 x 0.7 mm.

The rock is a microgranite.

008

214037

SPECIMEN R.17.

LOCATION: From dump heap from Cundy's Mine on Mt. Ramsay track.

HAND SPECIMEN: This is a fine grained green brown rock stained with iron oxide, especially on the weathered surface. Within the rock are small areas of coarse crystalline quartz which on the surface of the specimen may be up to 6 mm. in length and have associated with them distinct crystals of pyrrhotite cassiterite and sphalerite.

THIN SECTION: The groundmass of the rock is composed predominantly of a light green chlorite, 60%, 15% sericite and 20% Iron oxide which occurs mainly in the form of LIMONITE .while there is some 5% cassiterite.

The chlorite occurs as radiating plates up to 0.6 mm. in length, it also occurs as amorphous masses separating limonite rich zones. The limonite occurs either as small plates between chlorite crystals or as discrete irregular areas between groups of chlorite crystals.

The sericite occurs as very fine irregular masses of fine plates between the chlorite aggregates or as radiating aggregates of up to 0.6 mm. across. The distribution of the sericite appears to be uneven with some areas having up to 50% sericite.

The cassiterite occurs as irregular or tabular crystals with square cross sections of up to 0.4 mm. across. They are unequally distributed throughout the rock. The junction between the aggregate of quartz and the adjacent groundmass is generally outlined by a zone of limonite.

The rock is probably a hydrothermally altered GREISEN dyke within the Meredith Granite. The possible origin of the specimen was not investigated in the Cundy's Mine.

SPECIMEN R.18. is much the same as the above except that it contains considerably less chlorite but more limonite and sericite. It also contains a small zoned cassiterite crystal within the quartz aggregate sectioned.

009

214038

SPECIMEN An 63

LOCATION: Anomaly 63.

HAND SPECIMEN: The rock is medium grained with distinct crystals of black pyroxene set in a white to greenish coloured matrix of potah feldspar. The grain size of the pyroxene is uneven with the development of small aggregates within the rock.

THIN SECTION: The approximate modal composition is:

Orthoclose	- 61%
Augite	- 12%
Albite	- 15%
Chlorite	- 6%
Pyrite	- 6%

The augite occurs as enhedral to subhedral crystals, both as single crystals, being approximately 0.8 x 0.4 mm, or as glomeroporphyritic groups in which the crystals may vary from 1.6 x 0.7 to 0.4 x 0.4 mm. The augite has generally been altered with partial or complete replacement of the pyroxene by a light green chlorite. For this reason any finer material in the feldspar matrix is indistinguishable as pyroxene for it now consists of chlorite.

The albite occurs as tabular enhedral to subhedral crystals varying from 0.9 x 0.3 to 0.3 x 0.1 mm. These make up some 10% of the content of the rock and are distributed evenly throughout the rock amongst the orthoclose feldspar. The plagioclose shows no evidence of being associated with the glomeroporphyritic aggregates of pyroxene. No visible quartz is present in the rock.

Orthoclose makes up the greatest proportion of the rock occurring as distinct enhedral crystals or more generally as optically continuous plates enclosing the augite and the plagioclose. It is heavily sericitized, although some areas are still quite fresh, but generally the sericitization occurs within the cores of the crystals. Small areas of chlorite are also present within the orthoclose and these may generally be traced to surrounding areas of chloritized pyroxene.

Pyrite is a common accessory occurring as irregular crystals or as rectangular or cubic crystals varying from 0.2 x 0.1 mm. to 0.8 x 0.9 mm. This appears to be the last mineral to have crystallised as it cuts across both feldspar and pyroxene grain boundaries.

The rock is an alkali syenite.

SPECIMEN 52C.

LOCATION: From Anomaly 52.

HAND SPECIMEN: This is a medium grained light green rock in which a medium grained dark green amphibole is set in a fine grained white groundmass of orthoclase.

THIN SECTION: The approximate modal composition is:

Orthoclase	- 71%
Plagioclase	- 2%
Quartz	- 2%
Hornblende	- 25%

The Hornblende occurs as enhedral to anhedral crystals with well developed clearage and twinning. It is phleochroic from yellow, olive to dark green. Many of the crystals are emboyed and show signs of resorbtion suggesting the hornblende was the first mineral to crystallise from the melt.

The plagioclase An_{10} occurs as small enhedral well twinned elongate crystals up to 1.2 mm. x 0.6 mm. The plagioclase may abut against the hornblende and both are completely enclosed by large plates of well twinned orthoclase. The orthoclase generally tends to have suffered secondary alteration with the development of minor quantities of sericite within the orthoclase.

Chlorite occurs as a minor secondary alteration product and has been observed to partly or completely replace the hornblende, which may be present as small irregular relics together with small patches of sphene.

The quartz occurs as very fine interstitial aggregates of individual grains of approximately 0.04 mm. across.

The rock is a Hornblende syenite.

SPECIMEN 25.

LOCATION: From Anomaly 25 on Johnson Creek.

HAND SPECIMEN: It is an extremely fine grained crystalline black rock the surface of which has been extensively weathered.

THIN SECTION: It is a fine grained rock with an approximate modal composition of:

Olivine	- 25%
Plagioclose	- 40%
Titaniferous Augite	- 15%
Magnetite	- 3%
Chlorite	- 10%
Chabazite	- 7% (a zeolite)

The olivine generally occurs as anhedral rounded grains either individually, in which case they are approximately 0.3 mm. across or as glomeroporphyritic masses with crystals up to 1 mm across. But generally in the latter case the crystals consist of a number approximately 0.3 mm. The olivine has been extensively altered with the development of irregular areas usually governed by fractures within the crystal where pseudomorphs after olivine or relics thereof may be found. They now consist of a mixture of Iddingsite and talc. The separate identification of the two minerals is impossible as the two are intergrown as brown to green masses.

The plagioclose has a composition of approximately An_{50} with the presence of a few very fine calcic zones and occurs as very fine laths.

A zeolitic mineral is present in the rock, it is interstitial between the plagioclose laths and also amongst the olivine grains. In places it is even replacing plagioclose feldspar. It has a very low firefringence and has an imperfectly developed rhombohedral clearage. The mineral is chabazite.

The augite is slightly titaniferous generally occurring as small anhedral crystals of approximately 0.15 mm. in length. This augite is generally distributed evenly throughout the rock. Magnetite is also evenly distributed as small plates 0.15 x 0.01 mm., or as small cubes of approximately 0.12 x 0.12.

Chlorite is another secondary alteration product and is commonly found replacing plagioclose and some of the pyroxene and olivine, in the latter mineral it may be intimately associated with the Iddingsite.

The rock is an Olivine Basalt presumably of Tertiary age.

012

214041

SPECIMEN A7. collected by E. Eshuys.

LOCATION: On Mt. Ramsay track one mile north of Mt. Ramsay.

HAND SPECIMEN: This is a fine grained dark grey rock with distinct small crystals of plagioclase. The weathered surface of the specimen is approximately $\frac{1}{4}$ inch in depth and appears to be similar to a series of small pale brown spherical regions within the fresher rock.

THIN SECTION: The rock is an extremely altered basalt which is medium grained with a distinct ophitic texture and an approximate modal composition of

Plagioclase	- 45%
Titaniferous Augite	- 32%
Analcite	- 5%
Sphene	- 1%
Montmorillonite mixture	- 17%

The plagioclase occurs as elongate tabular laths approximately 0.8 x 0.2 mm. set in an almost continuous groundmass of optically continuous augite. The plagioclase is well twinned, with albite and pericline twins, and is unzoned having a composition of An_{48}.

The Augite is titaniferous, being slightly pink and phleochroic. The plates are irregular 1.8 mm. x 0.9 mm. and contain the scattered plagioclase laths.

The most characteristic feature about the rock is the presence of small aggregates of sphene and montmorillomite. These vary from irregular patches to semi-circular aggregates varying in diameter from 0.8 to 0.1 mm. They consist of sphene cores surrounded by a zone of radiating montmorillonite and/or other clay minerals and an iron oxide staining. These areas appear to be replacing the augite, with the titanium being taken up as sphene, but there is no evidence of leucoxene.

Analcite occurs as small irregular areas between the plagioclase laths, and may also surround some of the spherical aggregates of sphene and montmorallonite. It generally occurs as small aggregates of radiating crystals of approximately 0.5 x 0.03 mm. across. There are also small secondary plates of limonite throughout the rock but no evidence of primary leamatite.

The rock is titan augite basalt which has probably suffered a combination of diagenetic alteration and weathering to give the secondary mineral assemblage.

013

214042

SPECIMEN R.2. collected by E. Eshuys.

LOCATION: From falls to the Ramsay river on the stream flowing east and crossing the Mt. Ramsay Track $2\frac{1}{2}$ miles south of the Bischoff-Ramsay track junction.

HAND SPECIMEN: This is a light grey massive fine grained quartz arenite, intersected by a vein of white quartz, approximately 3 mm. wide, which contains numerous cubes of chalcopyrite approximately 0.5 mm. across.

THIN SECTION: This is an unmetamorphosed arenite with the approximate modal composition of:-

Quartz	- 98%
Detrital Muscovite, Biotite	- 2%

The quartz occurs as angular irregular grains of approximately 0.2 mm. across, between which there are much fine quartz grains which belong to the matrix material 6%. Within the matrix material are elongate flakes of fresh muscovite, these are quite commonly bent, up to 0.1 mm. in length. Biotite flakes also occur and these are commonly limonite stained. Between the quartz grains there are secondary yellow-green chlorite masses which have an irregular distribution, makes up approximately 2% of the rock, and these are frequently stained with limonite.

In thin section there is a distinct layering with another fine grained phase of quartz being approximately 0.1 mm. This layering has a greater percentage of secondary green chlorite and iron stained chlorite up to 25% of the rock, being contained between grains. A common accessory mineral is very fine grained pink tourmalite.

The rock is a quartz sandstone.

014

214043

SPECIMEN: R3. collected by E. Eshuys.

LOCATION: From falls on stream flowing east and crossing the Mt. Ramsay Track $2\frac{1}{2}$ miles from the Ramsay-Bischoff track junction.

HAND SPECIMEN: This is a fine grained dark grey well laminated shale. The laminations are defined by a series of dark evenly spaced partings which tend to be irregular as though they have suffered minor paracontemporaneous deformation.

THIN SECTION: The rock consists of extremely fine grained micaceous material and interstitial quartz. The mica makes up some 95% of the rock and consists of small grains and flakes of muscovite mica up to 0.04 mm. in length. The mica has grown to form a complete matt which encloses very fine quartz and/or plagioclase (?) being less than 0.01 mm in diameter and slightly rounded. Scattered through the rock there are larger quartz grains approximately 0.03 mm. in diameter.

The bedding fissility is defined by thin partings of limonite or a series of such partings, within which are generally a number of small limonite lenses 0.02 mm. across. There is also a tendency for the larger quartz grains to be concentrated in small lenses within these layers.

The rock is a muscovite shale.

SPECIMEN 25A.

Location: From the area of Anomaly 25 in Johnson Creek.

Hand Specimen: Extremely fine grained chocolate coloured chert collected as pebble. The rock lacks any notable structural feature except that it is intersected by a number of quartz veins.

Thin Section: The rock is extremely fine grained much less than 0.001 mm. with an approximate modal composition of:-

Quartz	90%
Muscovite	4%
Heamatite	6%

The quartz occurs as a microcrystalline mass of optically indistinct grains, but also contains occasional larger grains up to 0.02 mm. The muscovite occurs as very fine plates no more than 0.02 mm. in length and are distributed evenly throughout the rock as are the grains of heamatite of similar size.

Intersecting the rock are a number of quartz veins which are discontinuous and irregular in both shape and width. Their widths vary from 0.15 to 0.01 mm. the grain size within these veins generally increases towards the centre with very fine subgrains on the margins.

The rock is a fine grained chert in which the quartz veins are probably past consolidation structures intersecting an unconsolidated, or partly consolidated sediment. The heamatite is possibly a result of weathering, or diagenetic alterations of the chert, with the release of iron oxide from an originally colloidal silica.

SPECIMEN: 61.

LOCATION: Anomaly 61.

HAND SPECIMEN: This is a fine grained chocolate coloured sediment containing angular light grey and brown volcanic fragments and fragments of pumice up to 5 mm. across.

THIN SECTION: The groundmass consists of very fine grained heamatite, almost isotropic, within which are fine grains and fragments of quartz and volcanic material approximately 0.05 mm. diameter. This very fine detrital material defines a poor bedding foliation which is only visible in thin section, and consists of a series of uneven layers which tend to be updomed around larger volcanic fragments.

The fragments are of volcanic origin and vary in size from 0.06 mm. to 5 mm. across. They are generally rounded to subrounded and consist of a very fine albite and chlorite mixture. The pumice fragments contain fine albite laths up to 0.2 mm. in length the average being 0.1 mm. The groundmass between this feldspar consists of some 75% (of total fragment) of light green chlorite with 2% magnetite. The vesicules may be devoid of secondary minerals but most contain a very fine radiating light green chlorite. The size of the vesicules varies from 0.1 to 0.4 mm. in diameter. Not all fragments contain vesicules for most just contain an albite (20%), chlorite (75%), magnetite (5%) mixture. Large quartz fragments up to 1 mm across are also present and these consist of either fragments single crystals or small rounded recrystallised aggregates.

The rock is a volcanic sandstone in which the fragments and portion of the matrix are of volcanic origin probably being redeposited detritus from a volcanic source. The presence of the detrital quartz grains may also suggest that there is a second source area. The red colour of the matrix could either be of diagenetic origin or an oxidation effect at the time of deposition, if the sediments are shallow water.

SPECIMEN 24.3

LOCATION: On Wilson River one mile below junction with Yellow band, adjacent to granite contact.

HAND SPECIMEN: This is a well layered fine grained contact metamorphic rock which consists of alternating light brown and white layers together with a light green epidote rich and a broad brown layer. Chaleopyrite occurs as very finely disseminated crystals within the rock especially in the epidote rich phase.

THIN SECTION: The dark brown area in the rock consists of recrystallized fine grained quartz (55%) and biotite (40%), approximately 0.04 mm. across. Epidote occurs as small aggregates of approximately 0.3 mm. across enclosing small quartz crystals, their outline is uneven and it generally has a good cleavage developed.

The greater proportion of the rock consists of fine grained quartz and epidote, the proportion of the two varying from layer to layer, with an average variation of 55 to 80%. This portion of the rock is generally finer grained than the biotite region with the quartz and epidote approximately 0.002 mm. to 0.007 mm. across. The epidote occurs either as fine crystals distributed amongst the quartz or as aggregates of these fine grains in areas deficient in quartz. The reason because of the marked decrease in grain size from the biotite rich area to the epidote rich area may be because of the inhibition offered by the epidote to grain growth in the original quartz. Also contained in these areas are occasional grains of grossular garnet of approximately 0.003 mm. across. This garnet may make up 2% of total mineral constituents of such areas.

Intersecting the rock is a light green vein containing coarser epidote grains of approximately 0.6 mm. across which are intergrown with quartz. This being approximately 1 mm. wide. The chaleopyrite occurs as individual cubic and rectangular shaped crystals of approximately 0.02 mm. wide.

The rock is a quartz epidote hornfels. The INITIAL rock was probably a fine grained arenaceous sediment containing a high percentage of calcareous material.

SPECIMEN 24.5C

LOCATION: On Wilson River one mile below junction with Yellowband River, adjacent to granite contact.

HAND SPECIMEN: This is a fine grained layered rock which is dark brown-black containing poorly defined lamellae. Interbedded in the rock is a fine grained white layer approximately 9 mm. wide which itself contains a coarser light green epidote rich layer which contains some very fine crystals of chaleopyrite. This latter layer tends to be more resistent to weathering than the finer grained material and stands out as a small ridge.

THIN SECTION: The dark area, which makes up the major portion of the rock has the approximate modal composition of:

Quartz	- 44%
Biotite	- 55%
Chaleopyrite	- 1%

The average grain size for this area is approximately 0.015 mm. for both the quartz and biotite. The biotite occurring as decussate plates within the quartz. Epidote occurs occasionally in this area as very fine elongate crystals of approximately 0.15 mm. in length. The fine laminations visible in hand specimens are defined by a series of zones richer in biotite.

The fine white layering in the rock consists of 80% of very fine epidote, the rest being made up of quartz. The grain sizes of both components is less than 0.01 mm.

The light green layer wedged between the light coloured epidote layers is approximately 3 mm. wide and consists of a mixture of quartz (70%) and epidote (25%) with 5% chaleopyrite. The quartz and epidote are approximately 0.2 mm. across, and occur as irregular quartz crystals between which are irregular epidote crystals. The chaleodomy occurs as irregular grains of approximately 0.3 mm. across. Also in the rock is some 2% of very fine grossular garnet which occurs as irregular crystals between the quartz and epidote.

The rock is a Quartz biotite hornfels within which there is a vein of quartz epidote hornfels.

SPECIMEN RR.12.

Location: Three and a half miles down the Mt. Ramsay Track from the corinna road.

Hand Specimen: The specimen was taken from a boulder on the surface, it consists of a dark grey extremely fine grained rock in which there is a distinct layering of very fine alternating dark and fine layers much less than 1 mm. in width. This layering forms into a dark apparently unlaminated core. Intersecting the rock is a distinct planar layering of green amphibole.

Thin Section: The rock is extremely fine grained the average grain size being less than 0.02 mm. The modal composition of the rock is:-

Hornblende	45%
Quartz/plagioclase	50%
Magnetite	4%
Epidote	1%

The hornblende is ubiquous throughout the rock as very fine ragged auhedral, light green pleochroic crystals. Between the hornblende crystals are fine crystals of plagioclase and/or quartz, epidote and magnetite.

The epidote occurs as very small subrounded grains of $\leq$ 0.005 and these are possibly remnants of a lower grade of metamorphism which have persisted into a higher grade.

The quartz plagioclase groundmass is inseperable on a percentage basis into the two components as the plagioclase is untwinned and approximately 0.002 mm. across. The two components were distinguished on their interference figures and on a basis of their refractive indicies.

The layering visible in hand specimen is also visible in thin section and is defined by the relative proportion of hornblende within a layer of approximately 0.2 to 0.4 mm. in width. The darker zone noted in hand specimen appears to be richer in magnetite but still contains the same layering present in the major portion of the rock.

The veins of amphibole intersecting the rock consist of radiating and fibrous aggregates of hornblende with narrow elongate crystals up to 1.7 mm. in length.

The rock is a basic horfels belonging to the hornblende hornfels of contact metamorphism.

SPECIMEN RR8.

Location: One mile down Ramsay River from junction with Wombat Creek.

Hand Specimen: It is an extremely fine grained dark layered rock with two distinct layers present, one being darker grey than the other, the latter also contains some very fine lenticular laminations of darker material.

Thin section: The rock has an average grain size being 0.001 mm. The chief components of the rock are biotite, quartz and plagioclase with chaleopyrite as a prominant accessory mineral.

The biotite has a ubiquitous distribution throughout the rock, and is also concentrated in the distinct lenses visible in the hand specimen. These lenses are discontinuous are approximately 0.04 mm wide and generally consist almost wholely of dark brown decussate biotite.

The general bulk of the rock consists of fine grained brown biotite, approximately 30%, together with well distributed fine grained muscovite mica, approximately 10%, and a mixture of quartz and albite. The proportion of the latter could not be determined as the feldspar is untwinned, but appears to be less than the proportion of quartz.

Two very fine grained aggregates of chlorite also occur being approximately 0.02 mm. across. These may be products from diagenetic alteration of the rock. The chalcopyrite occurs as very finely disseminated cubes of approximately 0.04 mm. across, distributed evenly throughout the rock but concentrated along the lamination planes as may be seen on the surface of the handspecimen.

The rock is a biotite hornfels probably a result of the contact metamorphism of a finely laminated peletic rock which intervedded with the volcanics.

SPECIMEN RR9.

Location: One mile down Ramsay River.

Hand Specimen: This is similar to the above but much finer grained with many more fine laminations and it is a lighter grey in colour.

Thin Section: The decussate biotite is still the prominant mineral but there is a development of quite distinct sub and auhedral crystals of approximately 0.001 mm. across within the extremely fine grained biotite.

The rock is a biotite hornfels and is probably a result of either a pelite or a fine grained tuff similar to the above being contact metamorphosed.

U22

214051

SPECIMEN R.R.13.

LOCATION: East of Mt. Ramsay track $3\frac{1}{2}$ miles from the Corinna road.

Hand Specimen: This is a massive, black very finely crystalline rock with a high specific gravity. Intersecting the rock are a number of fibrous veins of light green amphibole together with a number of small lensoid patches of amphibole.

Thin Section: The rock is fine grained with a general decussate appearance of the amphibole, which is the major mineral. The rock also contains porphyroblasts of plagioclase. The approximate modal composition is:-

Hornblende	70%
Plagioclase	23%
Magnetite	7%

The hornblende for the most part occurs as ragged decussate crystals approximately 0.08 mm. across. These make up the groundmass for the larger grains of magnetite and porphyroblastic plagioclase. The hornblende also occurs as small irregular aggregates of coarses crystalline light green phleochroic hornblende. The aggregates vary from 0.6 mm to 1 cm. across and are composed almost exclusively of coarse hornblende with well cleaved grams up to 0.6 x 0.2 mm.

The plagioclase is untwinned albite and occurs as distinct euhedral crystals within the hornblende groundmass, varying in size from elongate laths of 1.3 x 0.14 mm to short tabular crystals of approximately 0.14 x 0.07 mm. The cores of these plagioclase crystals tend to be sericitized.

The magnetite occurs as ragged grains varying from less than 0.001 mm. to 0.3 mm.

The rock is a basic hornblende hornfels, probably a result of the contact metamorphism of a basic igneous rock with the cambrian volcanic sequence.

SPECIMEN A.3. collected by E. Eshuys.

LOCATION: On Mt. Ramsay Track miles from the Corinna Road.

HAND SPECIMEN: This is an extremely fine grained black hornfels containing quite distinct small biotite flakes which are distinguished from the bulk of the rock by their lustre. There is no obvious foliation within the rock although there may be a compositional difference which in hand specimen is defined by an indistinct layering recognisable as regions devoid of muscovite.

THIN SECTION: This is an extremely fine grained rock dominated by the presence of decussate biotite. The approximate modal composition is:-

Biotite	- 50%
Quartz	- 35%
Plagioclase	- 3%
Magnetite	- 12%

The quartz and plagioclase occurs as irregular angular grains varying from $\leq$ 0.03 mm. to 0.4 x 0.2 mm. The quartz occurs as fragments of optically continuous grains, these tending to be angular, and also as more rounded grains of crystalline quartz in which there are numerous subgrains. This latter type of quartz makes up some 5% of the rock. The plagioclase, as similar sized grains, is generally only recognisable by the presence of multiple twinning and partial sericitization.

The magnetite occurs as very fine grains and irregular aggregate of up to 0.1 mm. across. The biotite occurs as decussate grains throughout the rock intergrown with the magnetite and quartz or as small aggregates of approximately 0.13 x 0.03 mm. across. Individual biotite crystals are seldom $\leq$ 0.04 mm. in length, and consist of a light to dark brown biotite which in places may be greenish.

It is considered that the quartz and plagioclase are detrital grains which the biotite is a product of contact metamorphism of a fine grained tuff in which the rounded crystalline quartz aggregates may represent detrital grains transported from an adjacent area. The rock is a biotite hornfels probably formed by contact metamorphism of a basic tuff by the Meredith granite.

SPECIMEN A1. collected by E. Eshuys.

LOCATION: From 1½ miles south of the Mt. Ramsay-South Bischoff track junction.

HAND SPECIMEN: This is a fine grained hornfelsed sediment. The rock is dark grey with very fine laminations it also contains a series of fine grained light green layers up to 2 mm. wide in a zone 1.5 cm. wide.

THIN SECTION: The rock is fine grained but may be divided into two distinct types on mineralogical composition.

1) which is rich in biotite and (2) which is predominated by pyroxene.

1)	Biotite	- 25%	2)	Pyroxene	- 75%
	Quartz	- 58%		Quartz	- 21%
	Magnetite	- 12%		Chalcopyrite	- 1%
	Pyroxene	- 5%		Magnetite	- 3%

Both phases are extremely fine grained, the first being the darker area in hand specimen and consists of very fine irregular decussate biotite plates $\leq$ 0.008 mm. across. The groundmass consists of similarly a very fine quartz (plagioclase mixture?) within which are scattered a few very fine crystals of a light green pyroxene (diopside). Also scattered through the rock are similar very fine grains of magnetite.

The pyroxene (diopside) rich phase represents the greener portion of the rock and generally occurs as long slender bladed crystals up to 0.04 mm. in length. The quartz magnetite matrix is contained as above as very fine crystals. Two diopside phase exist in the different laminae, the predominant one is composed of the bladed crystals as above while the other consists of very fine interlocking mass of diopside $\leq$ 0.005.

The rock is a biotite pyroxene hornfels formed by the contact metamorphism of an extremely fine grained sediment.

U25

214054

SPECIMEN An.65 collected by D.M. RANSOM.

LOCATION: Anomaly 65.

HAND SPECIMEN: This consists of an extremely fine grained massive hornfels which is dark grey in handspecimen. A very fine microcrystalline micaceous mineral is present and is detected in handspecimen very fine lustreous crystal faces. Also in the handspecimen are a series of very small black areas which may be cordierite.

THIN SECTION: The thin section reveals that there is quite a distinct layering present, dividing the rock into three distinct compositional types.

1) A quartz biotite cordierite phase.
2) A biotite anthophyllite phase
3) A very fine laminated variation of (1)

The first phase has an approximate modal composition of:-

Biotite	- 70%
Magnetite	- 20%
Cordierite	- 7%
Quartz	- 3%

The biotite and magnetite have a ubiquitous distribution throughout the rock, the latter mineral occurs as very fine dust and as small irregular masses up to 0.1 mm. across, which may be contaminated by biotite. The biotite occurs as indiscrete crystals and as small diffuse patches scattered through the rock.

The quartz occurs as irregular grains up to 0.3 mm. across and is distinguished from the cordierite by the presence of small subgrains typical of a recrystallised texture. The cordierite is distinguished by its bioxial figure, ragged outlines and inclusions of biotite and anthophyllite. The cordierite also occurs as distinct grains within the biotite matrix up to 0.3 mm. across. The anthophyllite occurs only as extremely fine needles in the cordierite.

The fine grained phase is above in composition but contains no quartz and has quite distinct anthophyllite crystals up to 0.05 mm. in length. The general grain size of the biotite is $\leqslant$ 0.01 mm.

The fine grain size of this phase which occurs in a band 1 cm. wide probably reflects the original bedding in the sediment.

The Anthophyllite in the third phase may make up 2% of the rock as

elongate needles up to 0.2 mm. The remainder of this phase is similar to (1) except that it has slightly smaller cordierite aggregates developed.

The rock is a cordierite biotite hornfels. Probably a result of the contact metamorphism of a very fine grained basic volcanic sediment by the meredith granite. Because of the distance of the specimen from the margin of the grainite, and because of the intense metamorphism it has suffered it is suggested that the granite may be fairly near the surface.

027

214056

SPECIMEN: Mert.3.

Location: From Area of Merton Creek Anomaly.

Hand Specimen: This consists of alternating layers of coarse and fine to medium grained light green orthopyroxene. The layer of coarser material from which this specimen was taken was 3 inches in width and appeared to be completely monomineralic.

Thin Section: The rock consists of coarse grained orthopyroxene, Enstatite, the grains being euhedral to subhedral and averaging approximately 4 mm. across, with some crystals being up to 1 cm. x 0.5 cm. in size. Intersecting the orthopyroxene are irregular veins up to 1 mm. in width, these contain very fine layers of antigorite, but the majority are composed of prehrite. The Prehrite occurs as fine radiating crystals, up to 0.3 mm in length, and with vein-orthopyroxene boundaries being gradational.

The rock is a layered pyroxenite.

SPECIMEN H.W.1. collected by D.M. RANSOM.

LOCATION: From near the Harman River Camp II.

HAND SPECIMEN: This is a massive fine grained light grey serpentinite (pyroxenite), within which are a series of irregular fine grained black lenses 1 mm. wide and 2 cm. in length. These lenses appear to be composed of fine grained Magnetite similar to the larger individual cubes of magnetite scattered through the rock.

THIN SECTION: The rock consists of a series of very small grains of clino-pyroxene which commonly tend to have rounded outlines, being approximately 0.04 mm. across, and surrounded by an irregular meshwork of antigorite.

Approximately 20% of the rock is antigorite occurring as veins and small lenses between the grains of approximately 0.04 mm. in diameter. The antigorite is completely massive and may possess isotropic cores, there are no signs of deformation having taken place.

Intergrown with the antigorite in certain parts of the rock are small wisps of talc. In areas rich in talc the amount of pyroxene present is only 40% with approximately equal quantities of talc and antigorite.

The small dark regions in handspecimen consist of very fine dusty magnetite which is contained both within the pyroxene and the antigorite, suggesting that the magnetite was a primary mineral.

The rock is a serpentinized pyroxenite.

SPECIMEN H.W.2. Collected by D.M. Ransom.

LOCATION: On the Wilson river side of the Harman River, near the Harman River Camp II.

HAND SPECIMEN: This is a light greenish rock which consists of medium grained pyroxene and numerous small grains of black magnetite set in a whiteish background of talc.

THIN SECTION: The rock consists of 85% pyroxene in the form of large anhedral plates approximately 1.1 x 0.8 mm. across. These plates are frequently fractured and only rarely exhibit a good clearage. The pyroxene is a colourless variety of Augite.

Formed along some of these fractures, generally originating from small lenses between augite crystals, are veins of talc. The lenses of talc may be up to 1 mm. across, and consist of radiating talc which frequently contain small relics of the replaced clinopyroxene. The talc makes up some 12% of the mineralogical composition of the rock, but in some areas of very fine talc plates there may be as much as 25% talc in an area of 4 mm. in diameter. Magnetite occurs as small cubes of approximately 0.02 mm across within the pyroxene.

The rock is a hornfelsed pyroxenite in which the augite has been partially converted to talc.

030

214059

SPECIMEN H.W.3. collected by D.M. RANSOM.

HANDSPECIMEN: This is a light green to brown massive fine grained serpentinite. Within the handspecimen are distinct plates of light green pyroxene up to 3 mm. across, but these tend to grade into a white background of dolomite. There are also three small veins of chaleopyrite within the serpentinite, these are no more than 0.5 mm. in width and 3 mm. in length, they are irregular and have no obvious preferred orientation.

THIN SECTION: The rock is a monomineralic pyroxenite in which the clinopyroxene occurs as subhedral crystals with no well developed clearange, in plates up to 2 mm. across. This pyroxene is intersected by a meshwork of antigorite veins approximately 0.01 mm. across, which divide the pyroxene crystals into a number of small rounded subgrains of approximately 0.3 mm. in diameter, but the original outline of the crystal is still visible.

Also intersecting the rock are irregular discontinuous veins of talc, approximately 0.6 x 2 mm. or small areas usually approximately 0.4 x 0.4 mm. but these may be up to 2 x 1 mm. in size. Associated with this talc are a series of small irregular areas of dolomite. Within this dolomite and associated with the small cubes of chaleopyrite are small grains of a light green chlorite, probably of secondary origin.

The rock is a serpentinized pyroxenite.

SPECIMEN: H.W.4a collected by D.M. Ransom.

LOCATION: between the Wilson and Harman Rivers adjacent to the Harman River Camp II.

HAND SPECIMEN: This consists of a massive fine grained dark gray rock which has a slightly greenish tinge. The rock outwardly has the appearance of a pyroxenite but has superimposed upon it two distinct foliation planes, really a layering 4 mm. wide. The foliation is defined by a series of irregular discontinuous trains of a heamatite-chlorite mixture parallel to the foliation surface, which on the surface of the specimen has been completely weathered out.

THIN SECTION: The rock is composed mainly of extremely fine grained talc. The talc is commonly pseudomorphing orthopyroxene along the cleavage planes. Distinct crystals of talc are very rare, but the average size of the plates present are approximately 0.02 mm. Also scattered through the rock are small scattered crystals of a colourless amphibole-cummingtonite. This tends to occur as elongate crystals up to 0.3 x 0.4 mm. in size. These crystals appear to be scattered infrequently within the talc rich portions.

The small irregular veins intersecting the rock consist of heamatite, a yellow chlorite and limonite, which is a weathering product from the veins. The foliation planes are a similar mixture in veins up to 0.4 mm. in width. In the foliated region the talc is much finer grained and contains small poikoloblastic pseudomorphs of coarser grained talc pseudomorphing pyroxene crystals.

The rock is a contact metamorphosed pyroxenite in which the original pyroxene has been converted to talc. The rock is then a talc hornfels or mafic hornfels.

SPECIMEN 4b.

HAND SPECIMEN: This is much the same as the massive portion of the above consisting of a dark grey serpentinite intersected by very thin irregular veins of a heamatite chlorite mixture as in 4b.

THIN SECTION: The rock consists of talc similar to the massive part of the above specimen both in grain size and form and contains relics of the original pyroxene, which consists of both ortho and clino pyroxene up to 0.35 x 0.2 mm. in size. Within the rock are a series of heamatite lenses and parallel trains of extremely fine crystals heamatite. These probably represent exolved iron oxide in the original pyroxene.

The rock is a talc hornfels.

032

214061

SPECIMEN H.W.6. collected by D.M. RANSOM.

LOCATION: On the ridge between the Wilson and Harman Rivers near Camp II.

HAND SPECIMEN: This is a light grey to green serpentinite, with a distinct soapy feel, which contains a very marked foliation which tends to give the rock a silky appearance. The foliation is defined by a series of discontinuous green to grey lenses surrounded by discontinuous wisps of green serpentine. The width of the lenses defining the foliation are approximately 0.1 mm. in width.

THIN SECTION: The rock consists almost wholely of Antigorite which is arranged in a mesh network with the antigorite consisting of approximately rectangular flakes. Most grains exhibit undulatory extinction with very fine deformation bands at a variable angle to the extinction direction. These deformation bands generally tend to be at a high angle to the foliation. A very fine dust of opaque material is present throughout the antigorite and probably represents very fine crystals of Magnetite. Heamatite also occurs as large cubes and irregular grains up to 0.3 mm. across and appear to be secondary to antigorite.

The darker lenses seen in handspecimen generally consist of irregular lenses no more than 0.1 mm. across and up to 1 mm. in length, and consist of fibrous lamellae of antigorite with very fine fibres of magnetite perpendicular to the walls. This latter mineral appears to be an infilling of magnetite within the deformation lamellae. The densite of these lenses varies only slightly but a decrease in their number results in the presence of a lighter green area in hand specimens. The magnetite within these zones has been weathered slightly resulting in a staining of these zones with limonite.

The rock is a foliated serpentinite.

033

214062

SPECIMEN. MERT 4.

LOCATION: From Creek east of Merton Creek, half a mile south east of the Merton Creek anomaly.

HAND SPECIMEN: This is a weakly foliated, extremely fine grained light green-yellow rock. Within the hand specimen are small cubes of black heamatite.

THIN SECTION: Consists of massive iron stained serpentine which is intersected by numerous irregular and discontinuous veins of chrysotile up to 0.04 mm. in width, with the chrysotile occurring as very fine fibres at right angles to the wall of the vein. But for the greater part of the rock it consists of massive serpentine with a matted appearance because of the criss-crossing of the chrysotile veins, with the greater majority of beins defining the foliation.

Secondary plates of talc which are generally associated with the margins of limonite stained areas. Limonite staining is common especially on the edges of the large heamatite cubes, but also occurs as small scattered areas throughout the rock. The large heamatite cubes are up to 1.2 mm. across.

The rock is a serpentine which is probably an alteration product of the pyroxenite intrusion. The specimen comes from the margin of the pyroxenite belt and the distinct foliation may be a superimposed deformational feature formed during a period of marginal shearing and serpentinization, at which time the cubes of heamatite were introduced.

SPECIMEN 24B.

Location: Located between Moore & Johnson Creeks about ½ mile east of Moore Creek.

Hand Specimen: This is a light grey medium grained crystalline rock consisting of indistinct crystals of orthopyroxene. Intersecting the rock are a number of darker veins. There are also small areas in which there has been the development of a light green mineral plate.

Thin Section: The rock was composed of large plates of Enstatite which have suffered contact metamorphism from the adjacent Meredith Granite. Relic orthopyroxenes are generally preserved as a mass of interlocking irregular anhedral crystals varying from 4 x 2 mm. to an average size of 1.5 x 1 mm. The original clearage planes are only evident in a few of the grains, for the greater part of the rock the orthopyroxene now consists of a MESH of very fine subgrains within the larger. Within the larger crystals there is also fine grains of the colourless amphibole-cummingtonite.

The cummingtonite is unevenly distributed through the rock with small individual grains present in some areas while others consist almost completely of colourless cummingtonite, these are the small green particles in the hand specimen. Some of this cummingtonite instead of being distributed in small areas tends to pseudomorph the orthopyroxene and has developed parallel to the clearage planes which are defined by a mottled effect in the relic orthopyroxene.

The small irregular crystals of cummingtonite are generally found within the larger orthopyroxene with extremely fine grained talc, much less than 0.001 mm. across, and it appears as though the cummingtonite has developed from the talc rather than directly from the orthopyroxene. The vein observed cutting the rock in hand specimen consists almost wholely of talc.

The rock is a cummingtonite hornfels.

035

214004

SPECIMEN 65A. Collected by D.M. Ransom.

LOCATION: From Anomaly 65.

HAND SPECIMEN: This is an extremely fine grained dark gray hornfels. The rock is weakly foliated with the layering being defined by quartz rich layers and lenses up to 3 mm. across and also by a very fine indiscrete layering defined on a slightly quartz rich fraction. Intersecting the rock and in part parallel to the foliation are a series of lenticular veins of dark green actinolite. This actinolite occurs as very fine radiating aggregates of up to 2 cm. across.

THIN SECTION: The layering visible in hand specimen is very evident in thin section being an alternation of actinolite, fine quartz and coarse quartz rich layers. The actinolite rich layers vary from small veins and lenses of 0.06 mm. to 4.5 mm. in width. They generally consist of small radiating elongate crystals up to 8 mm. across of light to dark green phleochroic actinolite. Within these veins are also isolated areas of a deep green phleochroic chlorite, in areas some 0.13 mm. across, which are distinguishable from the actinolite by their relief and anomalous purple interference colours.

The quartz rich layering consists of both coarsely recrystalline quartz and very fine crystalline quartz. The coarser polyginal quartz grains are approximately 0.07 mm. across and are arranged in a layer varying from 2 to 5 mm. in width and grades into a very fine quartz on the margins, with the grain size $\leqslant$ 0.002 mm. and it consists of an aggregate of numerous subgrains. Within the quartz layers are small grains of epidote approximately 0.07 mm. across together with numerous small aggregates of actinolite and chlorite, up to 0.9 mm. across.

The greater proportion of the rock consists of a fine grained mixture of fine recrystallised quartz, actinolite of $\leqslant$ 0.02 mm, together with fine grained cubes of magnetite. The latter tends to be collected together in small lenses within the above phase of the rock. There are also a number of goethite lenses intersecting the rock, these are possibly of secondary origin.

The rock is an Actinolite hornfels which is probably a result of the contact metamorphism of part of the basic volcanic sequence by the Meredith granite.