

MICROFILMED

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

REPORT ON THE MT. LINDSAY AREA, TASMANIA

(SUMMER PROGRAMME 1967/68.)

by

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REPORT ON THE MT. LINDSAY SUMMER
PROGRAMME 1967/68.

(A) INTRODUCTION

The aim of the programme was to investigate possible extension or Repetitions of the Mt. Lindsay ore body by geological, geophysical and geochemical reconnaissance.

During the two month field season, four other anomalous zones were revealed parallel to the known ore body. Probable extension of the ore body to the granite contact was also ascertained. Two of the other anomalous zones had previously been revealed.

Interpretation of the geology and geophysics suggests that these anomalies are due to repetition of the lode horizon by axial plane faulting.

In this report, a brief resumé of the field methods used is followed by a discussion of the regional geology, with reference to previous work done. Brief hand specimen description of each of the stratigraphic units is given, in the absence of thin sections.

The detailed geology is described in terms of each anomaly, followed by a general interpretation of the structure and regional setting.

Finally the conclusions reached by the writers are set out in point form, followed by recommendations for future work necessary to ascertain the full potential of the Mt. Lindsay Area. At this time, the writers are confident that ore reserves will be increased considerably.

(B) FIELD METHODS1. Surveying

Previous survey work in the region of the known ore body (1962-64) was supplemented by stadia traverses over the anomalies to the south, and compass and tape traverses down Tulloch Creek, and to the east of the Mt. Lindsay ore zone.

All the data are shown on plans.

The purpose of the survey work was twofold:-

(i) To tie in the geophysical and geological information on plan;

(ii) To produce topographic profiles over most of the geophysical traverses, to allow for any topographic correction.

2. Geophysics

Magnetometer traverses were run over all new and old survey lines in the area. Initially, readings were taken every 50' on these lines, however, it was soon found that the very high, narrow anomalies characteristic of this region would be incompletely defined, or even missed on this scale. Thus most of the readings were taken at 25' intervals. It is strongly recommended that any future work be carried out at this scale.

To test whether the magnetic anomalies are due to sulphides, or merely magnetite, S.P. traverses were run over each anomaly. Here, it was found that 50' stations were sufficient to identify the anomalies.

The geophysical results are set out in profile on sheets L-68-13 - L-68-20.

Profiles along sets of parallel lines are aligned with reference to a transverse base line, to enable alignment of the anomalies.

3. Geochemical Work

Soil samples for geochemical analysis were taken over all anomalies, except anomaly No. 1. The location of each sample, and the concentrations and ratios are set out in table form in appendix II.

The values were plotted on plan as ratios, according to the scheme outlined below.

<u>Tin</u>		<u>Copper</u>	
Value (p.p.m.)	Ratio	Value (p.p.m.)	Ratio
0 - 5	0	0 - 40	0
5 - 10	1	40 - 60	1
10 - 20	2	60 - 100	2
20 - 40	3	100 - 150	3
40 - 60	4	150 - 200	4
60 - 100	5	200 - 300	5
100 - 200	6	300 - 400	6
> 200	7	> 400	7

These ratio values were then contoured.

4. Geology

Outcrop over the area is rather sparse and is restricted to the larger creeks and ridges. It is noted that the best outcrop occurs over and adjacent to the geophysical anomalies.

The main stratigraphic sequence is derived from the compass and tape traverse up Tulloch Ck., and from the mapping in the Wilson River. Outcrop over the anomalies provided the details around the lode horizon.

(C) REGIONAL GEOLOGY

The Tulloch Ck. and Wilson River work was interpreted to give the following stratigraphic sequence:-

<u>Approx. Thicknesses</u>	<u>Formation</u>
> 10,000'	{ Chocolate Shale (& turbidites). Khaki Shales & turbidites. Grey turbidites (including massive blue-grey dolomitic beds).
50' - 100'	Quartzites & Black cherts.
5' - 50'	Lode Horizon, grey & pink cherts.
Approx. 10'	Grey, thinly-bedded, fine turbidites

The thicknesses given here are very approximate, due to the paucity of outcrop.

Structural analysis in the Wilson River and Tulloch Ck., together with Hopwood's (1964) work on the diamond drill cores, has completely revised the previously interpreted anticlinorium structure of Hopwood.

The interpretive section (sheet L-68-1) shows the main structure to be a large syncline, extending from the Pieman River to midway up Tulloch Ck., with its northern limb faulted off. The trend of this structure ranges from 280° to 320° , and it appears to be quite shallowly plunging to the W.N.W.

In the immediate Mt. Lindsay area, repetition of the lower part of the stratigraphy occurs. This repetition is here attributed to axial plane faulting in the anticlinal structure immediately north of the main syncline. It is this same faulting which has apparently resulted in the removal of over 10,000' of sediments on the northern limb of the syncline.

The series of parallel anomalies are considered to be due to repetition of the lode horizon by this mechanism. It is notable that the shape and magnitude of the magnetic profiles agree with this structure, in as far as they can be interpreted. The general profile shape can be summarised by gradual build up, with a number of smaller peaks on the northern (upward facing) side of the main anomaly, which drops off very sharply on the southern side. This is closely comparable with a steeply northerly dipping ore body, with minor flexures, which has been faulted off on its southern side. This is in full agreement with the interpreted structure.

Detailed work in the Wilson River area, in addition to that of Hopwood, has shown that there are both small and large scale swings in the trend of the structure. This is attributed primarily to the effect of a less prominent second generation of folding, and to a lesser extent, minor faulting. However, in the immediate Mt. Lindsay area, the structure seems

to be extremely persistent along a constant strike of 280° - 290° .

It is suggested that the more westerly trend at Mt. Lindsay, compared to the north-westerly trend further south, may be due to forcible intrusion of the Meredith Granite. Evidence for this is rather sparse, however, the parallelism of the strike to the southern boundary of the granite is in accord with similar structures attributed to forcible intrusion elsewhere (Buddington, 1959).

Minor displacement of the ore body along faults at a high angle to the proposed axial plane faults has been noted by previous workers, on the evidence of drill core logging and detailed mapping of the ore body. No evidence has been found contrary to this interpretation. The writers consider that these may represent a set of high-angle cross-faults. The scale of this faulting is not large enough to enable its detection from the geophysical data on the other anomalies.

Correlation:-

Previous workers in the area (Ransom & Wilson, 1966; Hopwood, 1963-4) have correlated the rocks in the Mt. Lindsay area with those at Mt. Cleveland. In this interpretation they mistakenly identified the contact metamorphosed grey turbidites (grey-green hornfelses) as basic volcanics, including the metamorphosed quartzites with these.

Hopwood's anticlinal structure then placed these "basic volcanics" directly over the lode horizon, which was in turn underlain by grey arenites and the chocolate shales.

This sequence was then closely comparable with that at Cleveland, as shown below.

<u>Cleveland Sequence</u>	<u>Previous Lindsay Sequence</u>
Basic Volcanics	Basic Volcanics
Lode Cherts	Lode Cherts
Chocolate Shales	Grey Arenites
Mica Sandstone	Chocolate Shales

It was on this basis that the comparison with Cleveland was made.

The revision of the structure and stratigraphy during this field season has completely erased any stratigraphic similarities with Cleveland. It is now considered that a much closer relationship exists with the sequence at Renison Bell. The following discussion on the broad, regional correlation enhances this connection.

Regional Correlation:-

The rocks of the Mt. Lindsay - Wilson River region have been variously correlated with the Dundas Group, the Carbine Group and the Crimson Creek formation.

Taylor (1954) placed similar rocks along the Pieman River within the Carbine Group, underlying the Dundas Group. However, Banks (1956) pointed out resemblance to the Dundas Group, and Campana and King (1962) included them in this group in a regional map. However, Blisset (1962) calls them the Crimson Creek Formation, which passes up conformably into the Dundas Group. In places it conformably overlies the Oonah quartzites, as it does near the junction of the Pieman and Wilson Rivers.

It is thus suggested that the stratigraphic sequence in this region belongs to the Crimson Ck. Formation as defined in the Australian Code of Stratigraphic Nomenclature.

(D) HAND-SPECIMEN PETROGRAPHY

In this section a brief description of each of the stratigraphically significant rock-types is given. Specimen numbers coincide with those submitted for thin-section preparation, where applicable.

1. Chocolate Shales

This sequence consists of purple and red shales and turbidites, with interbedded grey and brown shales and turbidites.

The shales range in colour from red-brown to mauve, and are uniformly fine grained. They are generally massive, although laminated and rare cross-bedded varieties have been found. The coarser members of the turbidites in this sequence are purple in colour and consist predominantly of lithic and feldspathic detritus, with minor mica and rare quartz, in a fine purple matrix.

Blisset (1962) reported the presence of "thin bands or partings of greywacke", however, the writers have found that the greywacke is quite extensive, and that the sequence seems to be essentially of turbidite-type origin.

2. Khaki Shales and Turbidites

These rocks are essentially similar in many respects to those described above, except for the obvious colour differences. They range from khaki to brown in colour, and from mudstone to medium-grained greywacke in grain size.

The detritus is once again mostly lithic and feldspathic, although examples rich in mica are quite common, especially in Tulloch Ck. These are very similar in appearance to the Mica Sandstone at Cleveland.

3. Grey Turbidites

Ranging from light to medium grey in colour these rocks are similar in composition and grain size to those described above. There is a little more quartz in the detritus of the coarser greywackes than in the brown and purple types.

Some black, almost carbonaceous-looking, shales are interbedded with the finer members of this sequence, especially near its base.

Common within the grey turbidite sequence are softer blue-grey greywackes, and banded light and dark grey siltstones. The softness of these rocks indicates that they may be rich in carbonate. It is the latter type which is mineralised in the Wilson River, and its tributary creek (see separate Wilson River note).

4. Quartzites and Black Cherts

The quartzites are quartz-rich greywackes and arenites. The quartzitic appearance which gave them their field name is probably due to some induration during contact metamorphism.

The detritus in the quartzites consists predominantly of quartz and chert fragments, with minor mica and feldspar. It is notable that the chert fragments are similar to the underlying lode cherts in colour and appearance. The matrix is fine grained and mid-grey in colour.

The black cherts are irregularly distributed as thin (up to 6") bands through the quartzites. It is notable that wherever the quartzites contain sulphides (esp. over Anomalies 3 and 4) the black cherts are quite barren.

5. Lode Cherts

The lode cherts are pale grey, pale grey-green or pink in colour. They are either thinly-bedded in pink and grey (beds up to $\frac{1}{2}$ " thick), or they are highly brecciated, with the grey and green colours predominating.

It was found in the banded varieties that the grey bands were preferentially replaced by sulphide, and that the pink bands were almost barren. The softness of the grey bands may indicate the presence of carbonate, whereas the pink bands were hard and silicous in appearance.

The detailed mineralisation is described later.

6. Meredith Granite

Two phases of the Meredith Granite were found in the immediate vicinity of Mt. Lindsay.

- (a) Quartz-tourmaline veins, dykes and marginal phases.
- (b) Porphyritic microgranite in one dyke, and adjacent to the quartz-tourmaline phase just within the granite.

The quartz-tourmaline forms a marginal phase around the granite at the ends of lines 12W (Lindsay grid), 64E, 60E & 56E (Stanley-Lindsay Grid). It also occurs as two dykes in Tulloch Ck., north of the ore-body, and as veins and patches in the porphyritic microgranite. The distribution of the tourmaline in this phase is completely irregular. It may constitute from 20% to 90% of a particular rock.

The porphyritic microgranite consists of phenocrysts of K-feldspar (and possibly minor plagioclase) and quartz, in a fine-to medium-grained groundmass of quartz, feldspar and lesser biotite. The phenocrysts range up to 5 mms. in diameter, and are euhedral in the case of the feldspar, and anhedral in the case of quartz.

7. Hornfelses

The hornfelses which outcrop in the Mt. Lindsay area are grey-green or very dark grey in colour. They seem to be of two types:

- (a) Quartz-rich.
- (b) Feldspar-amphibole-rich.

The grainsize ranges from very fine to medium-grained (up to

1 mm.) in both types.

Without thin-section work it is difficult to elucidate the mineralogy and origin of these hornfelses. However, it is suggested that the quartz-rich varieties originate from the quartzite sequence, and that the grey turbidites give rise to the amphibolitic types. The feldspathic and lithic nature of the detritus could produce these minerals, especially if the lithic material is of volcanic origin.

(E) DETAILED GEOLOGY AND GEOPHYSICS OF THE MT. LINDSAY AREA

Each of the five anomalies (including the ore body) will be discussed in turn, with its relevant geology, geochemistry and geophysics. The numbering of the anomalies is as shown on the plan.

1. Anomaly No. 1

This anomaly has been traced sporadically from line 16E to line 4W, and is suspected to extend further in both directions. It has been drilled in 5 places (D.D.H. 19, 20, 21, 22 and) near line 16E. No tin, and only minor sulphides were found in the drill cores.

Outcrop was found over the anomalies just north of D.D.H. 19 and 20. It consisted of quartzites (with minor pyrrhotite) and black cherts overlying pale grey cherts similar to the lode horizon. Disseminated sulphide was also present in the grey cherts.

The magnitude of the anomaly ranges from 6,000 γ to 30,000 γ adjacent to the outcrops described above. It is impossible to correlate the size of this anomaly with the drill results, although a detailed core log has not been seen by the writers. Unless magnetite (unrecorded in the brief drill reports) was present in considerable quantities, it is suggested that the drilling did not locate the prime source of the anomaly.

It is also noted that quartzite floaters occur at the heliport, just north of the projected line of Anomaly No. 1. This also ties in with the suggested stratigraphy.

2. Lode Anomaly (Known Orebody)

The present work only covered the main ore body with detailed geophysics. However, lines 16E and 12E revealed small geophysical anomalies, indicating possible extension in this direction. Although no anomaly was found on 16W, just beyond the extent of the known ore zone, plans just to hand show that the anomaly was again picked up on lines 18W and 20W. Thus the extent of this anomaly is from 16E to 20W, and probably further. Work to test this extension is outlined in the "Recommendations" section, below.

Examination of the ore material showed that mineralisation occurred in the bleached, brecciated cherts. Outcrop of the thinly-bedded footwall shales also occurred here, adjacent to the bridge over Tulloch Creek.

Great variation along strike characterised the magnetic anomaly over the ore body. Variation from 10,000 γ to 95,000 γ occurred along strike. Examination the drill cores from D.D.H. 30, 8 and 13 should help to elucidate any correlation between this variation in magnetics and the distribution of magnetite and pyrrhotite within the ore zone.

It is also noteworthy that, if, as thought by the writers, the

anomaly extends to the granite, the ore zone would extend to some 3000' from the contact.

One self-potential traverse along line 4W confirmed the contribution of sulphides to the anomaly.

3. Anomaly No. 2

This anomaly is known to extend from the first tributary of South-East Ck. (peg 6 on base-line out to the diorite) to the granite contact at 14 $\frac{1}{4}$ N on line 12W. This gives it a strike length of over 4000', with possible further extension to the east.

With regard to geophysics, geochemistry and geology, this anomaly is identical in every respect to the ore body. The lode rocks are banded and brecciated cherts, which have been found outcropping on 12E and 12W, and as floaters on most of the other lines. The magnetic anomaly ranges from 15,000 γ to greater than 100,000 γ on the track to the Parson's Hood Heliport. The mineralisation is very similar, with pyrrhotite predominant. Magnetite was also found near O'Brien's adit, as were some fairly large (2-3 mms.) crystals of cassiterite.

The writers consider that the potential of this anomaly is considerable, especially in the light of the presence of tin in the ore body up to 3000' from the granite contact.

4. Anomaly No. 3

Anomaly No. 3 has been traced from line 16E to line 64E (Stanley-Lindsay grid). Its eastern extent is unknown. However, it seems to peter out in a westwards direction around line 64E. Its magnetic anomaly is in the 10,000 γ - 15,000 γ range throughout.

Rocks associated with this anomaly outcrop in Tulloch Ck. as bleached lode horizon cherts containing pyrrhotite and pyrite. On lines 72E and 84E, outcrops of quartzite containing minor sulphide, and black chert were found.

5. Anomaly No. 4

The magnetic anomaly has been traced from the Lindsay-Stanley track to line 56E, and its limit has not been reached in either direction. Its magnitude is of the order of 10,000 γ to 30,000 γ , averaging 15,000 γ . A self-potential traverse along line 84 produced a 350-400 m.u. anomaly which coincided closely with the magnetic anomaly.

Outcrop is extensive along this anomaly, and consists primarily of quartzite with up to 10% pyrrhotite, and bands of barren black chert. Minor bleached cherts outcrop within the quartzites on line 84; they also contained disseminated sulphide.

If this anomaly does extend west along strike, then it would pass very close to the Stanley-Reward ore zone and gossan.

6. Miscellaneous Anomalies

(a) A large (10,000 γ) anomaly was found at peg 26 on the track to Salmon Creek. Time did not permit investigation of this anomaly (see "Recommendations").

(b) A banded chert bed about four feet wide was found in the easternmost tributary of South-East Ck. (1000' north of peg 30 on base-line to the diorite). This bed contained quite abundant sulphide, and was faulted off at its north-western end, against grey-green hornfelses.

A magnetic anomaly of 18,000 γ , and a self-potential anomaly of 100 m.v. were obtained over this chert band. However, lines cut either side of this creek did not pick up this anomaly, so it is not considered to be important.

(F) GEOCHEMISTRY1. Anomaly No. 2

The geophysical anomaly No. 2 was pinpointed by Tin and Copper anomalies from soil samples. The values are closely comparable to those obtained over the ore body on lines 4W and 8W.

The contour plans (I-68-21 and I-68-22) show that tin is a better indicator of the anomalies than copper in this particular area. As seen on the plans, the geochemical anomaly is 100' to 150' south of the geophysical anomaly. However, this displacement is in a downhill direction, which may be correlated with movement of the trace material with the drainage.

2. Anomalies No. 3 and 4

The geochemical results from these anomalies are plotted on plans I-68-21 and I-68-22. On the basis of the ratios outlined previously, all the copper values are zero except two. Also the tin values are not large enough to be considered significant, all but three being 2 or less. Also the small variations present are completely random, bearing no relationship to the magnetic anomalies.

(G) MINERALISATION

The mineralisation in the known ore body consists predominantly of pyrrhotite, pyrite, magnetite, chalcopyrite and cassiterite.

The association of the cassiterite has not been documented, and some detailed work on this problem could be important. Correlation of the distribution of the cassiterite with that of the magnetite and sulphides could provide some valuable information. For example, no magnetite is recorded in the drill cores from Anomaly No. 1, which is also deficient in tin, whereas the orebody contains quite abundant magnetite.

If there was a connection, it could reflect the presence of a temperature control on the distribution of cassiterite with the high temperature magnetite. Thus there could be a limit on the distance that the tin could be found away from the granite.

The disseminated mineralisation found over all the anomalies consists predominantly of pyrrhotite with lesser pyrite. Magnetite was found in a floater near anomaly 4 on line 84. Cassiterite is only found in hand specimen over anomaly 2, near O'Brien's adit.

(H) CONCLUSIONS

1. Revision of the structure, as outlined above, indicates that the geophysical anomalies may be due to repetition of the lode horizon by axial plane faulting, as occurs at Cleveland.

2. These anomalies definitely contain sulphide mineralisation. The determining factor controlling ore reserves is the distribution of cassiterite within these sulphide bodies. This can only be determined by detailed polished section work on the ore body lode, followed by drilling.

3. The stratigraphy, especially in the vicinity of the ore horizon, seems to be closely related to that at Renison Bell. There is thought to be little or no connection with the Cleveland sequence, as previously proposed. It is considered feasible that the Mt. Lindsay-Wilson River stratigraphy may well be a continuation of the Renison Bell sequence along strike.

4. On the basis of similarities to the ore body, and the extent of Anomaly No. 2, the reserves of inferred ore may be of considerable magnitude.

5. Geophysical results on anomalies 3 and 4 are highly favourable, but geological evidence is inconclusive regarding actual increase in ore reserves.

6. Regarding the absence of tin from Anomaly No. 1, the brief drilling reports (rare and disseminated sulphides) do not indicate the reason for the large (up to 30,000 γ) magnetic anomaly. Thus the writers suggest that the drill holes did not intersect the main zone of mineralisation.

7. The poor geochemical results over anomalies 3 and 4 may be due to the fact that the lode cherts do not actually outcrop. Only the hanging wall quartzites outcrop, and these do not contain appreciable tin. There may still be tin at shallow depths within the lode horizon cherts.

(I) RECOMMENDATIONS

1. Extend line 72E north until it crosses the granite contact, to test the extension of the ore body and Anomaly No. 1 westwards. Also traverse line 20W (Northwards) with the magnetometer, and then traverse in lines every 400' to the granite.
 2. More detailed geochem. and geophysics over anomaly No. 2. It is suggested that a base line be cut along the anomaly as it is known at present, and that short (200' either side) traverse lines be cut across this at 200 foot intervals, to supplement the present lines. These lines should be continued in an easterly direction until the anomaly ceases. It is also suggested that close examination of the area between 8W and 12W be carried out, to explain the northward displacement of the anomaly on 12W.
 3. The extent of Anomaly No. 4 must be ascertained both to the east and west. To the west it is suggested that lines be cut every 800' (52E, 44E, 36E, etc.) on the Lindsay-Stanley grid, to the Stanley-Reward ore zone. They should be cut south of the base line until the anomaly is reached, or at least 300'-400' past its suggested position as located from previous lines.
- A compass and tape, geological and geophysical traverse down South-East Ck. would test the eastern extension of all the anomalies. If the anomalies are picked up here then traverse lines south from the base-line to the diorite would be necessary, initially every 400'.
4. Extend Mt. Lindsay grid lines 10E, 8E, 4E, 0E, 4W, 8W, 12W, 16W, 20W, etc. (until the granite contact) south to test Anomaly No. 1 with magnetics and geochem.
 5. Check the geology in Tulloch Ck. near pegs 200 and 150 to ascertain the presence or absence of the axial plane faults beneath the chert and quartzite horizons.
 6. Investigate the anomaly on the Salmon Ck. track by cutting short north-south lines at 400' intervals east and west of the anomaly.
 7. Closely inspect the drill logs, and if necessary re-log them, to test the immediate lode horizon stratigraphy, and to try to relate the magnetic variations along strike of the ore body with distribution of mineralisation.
 8. It is strongly recommended that all the above work be completed and interpreted before any drilling is commenced. The writers consider that the work will require 6 - 8 weeks fieldwork for a party of 6 (including 2 geologists, or 1 geologist and 1 geophysicist).
 9. After completion of this work, it is further suggested that Anomaly No. 2 be drilled first. It should be drilled along its entire length at 400' spacings, commencing on or near 12W, and working east.

The extension of the known ore body to the granite should be tested next, followed by Anomaly No. 4 and other areas as suggested by the future work.

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APPENDIX I - SUPPLEMENTARY WILSON RIVER REPORT

The original intention of this work was to find the basic volcanics which should have outcropped on the southern limb of Hopwood's anticline. As outlined in the main report these volcanics were not found, and the stratigraphy has been revised.

The Wilson River was mapped from Salmon Creek to the Pieman River. A brief traverse was also carried out for a short distance along the Pieman River, west from the Wilson River.

The geological mapping showed that most of the rocks consisted of a sequence of chocolate, mauve, brown, light and dark grey turbidites and shales. Underlying these, in the Pieman River, are grey silicified quartzites and siltstones, with some unsilicified bands.

1. Stratigraphy

The internal stratigraphy of the turbidite-shale sequence has been discussed in the main report. However, the detailed stratigraphy in the southern part of the area was mapped, because of its similarity to the sequence at Renison Bell.

> 10,000'	Shale & Turbidite Sequence.
Approx. 50'	Banded grey dolomitic siltstones
	containing sulphides.
Approx. 40'	Red Jaspers and silicified tuffs.
50' - 100'	Thinly-bedded grey shales.
Approx. 500'	Brown, grey and chocolate shales
	and turbidites.
> 1,000'	Grey quartzites and siltstones.

The thicknesses are very approximate.

This compares very closely with the following sequence found at Renison Bell.

> 5,000'	Argillites.
	Lode beds (dolomitic).
	Red Rock.
	Renison Bell shales.
	Quartzites.

The mineralisation also showed similar distribution to that at Renison Bell, with minor pyrite in the red jaspers and extensive pyrite in the banded, dolomitic grey siltstones.

As far as regional correlation is concerned, it would seem that the boundary between the Crimson Creek Formation and the Oonah Quartzites (Success Creek Phase) occurs in these rocks. The boundary seems to be conformable and occurs right at the junction of the Wilson and Pieman Rivers. The basal beds of the Crimson Creek Formation are probably the

chocolate turbidites and shales outcropping in the Pieman River just east of the Wilson River.

2. Mineralisation

Pyrite mineralisation occurs in the red jaspers and the banded, grey, dolomitic siltstones, as well as scattered throughout the shale members of the quartzite sequence.

Up to 30% sulphide was found in the light grey bands of the dolomitic beds, as fine, disseminated pyrite. Less extensive pyrite mineralisation was found in the red jaspers, with gossanous rocks showing fairly extensive primary sulphide structures. No pyrrhotite was found in these rocks, although one specimen was found containing minor sphalerite. Veins of quartz and pyrite were also present in the red jaspers.

3. Recommendations

It is recommended that magnetometer and geochemical traverses be run across the mineralised red jaspers and dolomitic rocks. However, their outcrop must first be mapped. It is suggested that mapping along the Pieman, east of the Wilson should locate them. They may be harder to trace on the western side of the Wilson River, where outcrop is sparse, but this area should be investigated.

Assays of the mineralised red jaspers and banded rocks could also be carried out.

MICHAEL ETHERIDGE

APPENDIX II - GEOCHEM. SAMPLE RESULTS

Line & Station	Geochem. Sample Nos.	Sn Value (p.p.m.)	Cu Value (p.p.m.)	Sn Contour Value	Cu Contour Value
LINE 12E.					
ON	L79	X	70	0	2
IN	L80	5	61	1	2
2N	L81	< 1	51	0	1
3N	L82	X	66	0	2
4N	L83	< 1	66	0	2
5N	L84	6	88	1	2
6N	L85	50	156	4	4
7N	L86	20	136	3	3
8N	L87	< 1	100	0	3
LINE 16E.					
ON	L42	5	82	1	2
IN	L43	X	30	0	0
2N	L44	< 1	50	0	1
3N	L45	40	70	4	2
4N	L46	X	32	0	0
5N	L47	10	51	2	1
5N-50'W	L48	X	60	0	2
5N-50'E	L49	< 1	50	0	1
6N	L50	< 1	30	0	0
LINE 16 E. S.					
1	L20	X	56	0	1
3	L21	6	88	1	2
5	L22	X	97	0	2
7	L23	14	88	2	2
8	L24	5	94	1	2
9	L25	4	97	0	2
11	L26	8	59	1	1
13	L27	8	56	1	1
15	L28	4	56	0	1
17	L29	4	30	0	0
18	L30	3	47	0	1
19	L31	4	41	0	1

APPENDIX II - GEOCHEM. SAMPLE RESULTS

Line & Station	Geochem. Sample Nos.	Sn Value (p.p.m.)	Cu Value (p.p.m.)	Sn Contour Value	Cu Contour Value
LINE 0E					
2N	L51	X	80	0	2
3N	L52	15	80	2	2
4N	L53	30	176	3	4
5N	L54	X	91	0	2
6N	L55	80	156	5	4
7N	L56	50	300	4	6
8N	L57	100	120	6	3
9N	L58	8	30	1	0
10N	L59	4	38	0	0
LINE 4E					
0N	L60	8	59	1	1
1N	L61	9	64	1	2
2N	L62	30	80	3	2
3N	L63	8	66	1	2
4N	L64	10	100	2	3
5N	L65	100	148	6	3
6N	L66	50	161	4	4
7N	L67	15	88	2	2
8N	L68	< 1	56	0	1
9N	L69	< 1	51	0	1
LINE 8E					
0N	L70	X	56	0	1
1N	L71	20	49	3	1
2N	L72	15	66	2	2
3N	L73	70	20	5	0
4N	L74	50	88	4	2
5N	L75	80	110	5	3
6N	L76	10	85	2	2
7N	L77	< 1	76	0	2
8N	L78	X	70	0	2

APPENDIX II - GEOCHEM. SAMPLE RESULTS

Line & Station	Geochem. Sample Nos.	Sn Value (p.p.m.)	Cu Value (p.p.m.)	Sn Contour Value	Cu Contour Value
LINE 64E					
28	L145	18	34	2	0
30	L144	20	32	3	0
32	L143	10	38	2	0
34	L142	6	36	1	0
36	L141	20	36	3	0
LINE 60E					
18	L146	X	32	0	0
22	L147	30	24	3	0
24	L148	X	16	0	0
26	L149	10	12	2	0
28	L150	15	20	2	0
30	L151	X	22	0	0
34	L152	2	42	0	1
LINE 56E					
17	L158	X	24	0	0
19	L157	6	10	1	0
21	L156	20	18	2	0
23	L155	X	20	0	0
25	L154	30	38	3	0
27	L153	20	49	2	1
LINE 68E					
5	L161	16	42	2	1
7	L162	30	49	3	1
9	L163	14	56	2	1
11	L164	12	56	2	1
LINE 72E					
100N	L165	20	28	2	0
B.L.	L116	16	30	2	0
100S	L167	30	61	3	2
200S	L168	6	44	1	1

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APPENDIX II - GEOCHEM. SAMPLE RESULTS

Line & Station	Geochem. Sample Nos.	Sn Value (p.p.m.)	Cu Value (p.p.m.)	Sn Contour Value	Cu Contour Value
LINE 12W					
1S	L129	12	61	2	2
OS	L130	10	56	2	1
1N	L131	8	166	1	4
2N	L132	X	59	0	1
3N	L133	X	59	0	1
4N	L134	X	40	0	1
5N	L135	30	64	3	2
6N	L136	12	56	2	1
7N	L137	30	97	3	2
8N	L138	70	117	5	3
9N	L139	70	136	5	3
10N	L140	50	91	4	2
LINE 8W					
ON	L128	60	94	5	2
1N	L127	40	56	4	1
2N	L126	400	56	>> 7	1
3N	L125	40	61	4	2
4N	L124	10	71	2	2
5N	L123	10	54	2	1
6N	L122	8	44	1	1
7N	L121	8	28	1	0
8N	L120	X	44	0	1
9N	L119	X	49	0	1
9 $\frac{1}{2}$ N	L118	6	40	1	1
LINE 4W					
2N	L108	400	490	>> 7	7
3N	L109	300	128	7	3
4N	L110	60	114	5	3
5N	L111	30	40	3	1
6N	L112	20	40	3	1
7N	L113	80	51	5	1
8N	L114	X	36	0	0
9N	L115	X	56	0	0
10N	L116	X	38	0	0
11N	L117	20	32	3	0

APPENDIX II - GEOCHEM. SAMPLE RESULTS

Line & Station	Geochem. Sample Nos.	Sn Value, Parts/10 ⁷	Cu Value, Parts/10 ⁷	Sn Contour Value	Cu Contour Value
NO. "1" ANOMALY. "LINE 84E".					
18½	L1	10	47	2	1
20	L2	5	51	1	1
20-100'W	L3	10	59	2	1
20-100'E	L4	5	85	1	2
22	L5	9	49	1	1
22-100'W	L6	6	54	1	1
22-100'E	L7	6	44	1	1
15 (Stadia Peg)	L8	14	40	2	1
15-100'W	L9	4	56	0	1
15-100'E	L10	18	49	2	1
17 (Stadia Peg)	L11	10	44	2	1
17-100'W	L12	9	51	1	1
17-100'E	L13	8	49	1	1
27	L14	7	49	1	1
27-100'W	L15	3	54	0	1
27-100'E	L16	8	36	1	0
28	L17	8	54	1	1
28-100'W	L18	5	44	1	1
28-100'E	L19	10	47	2	1

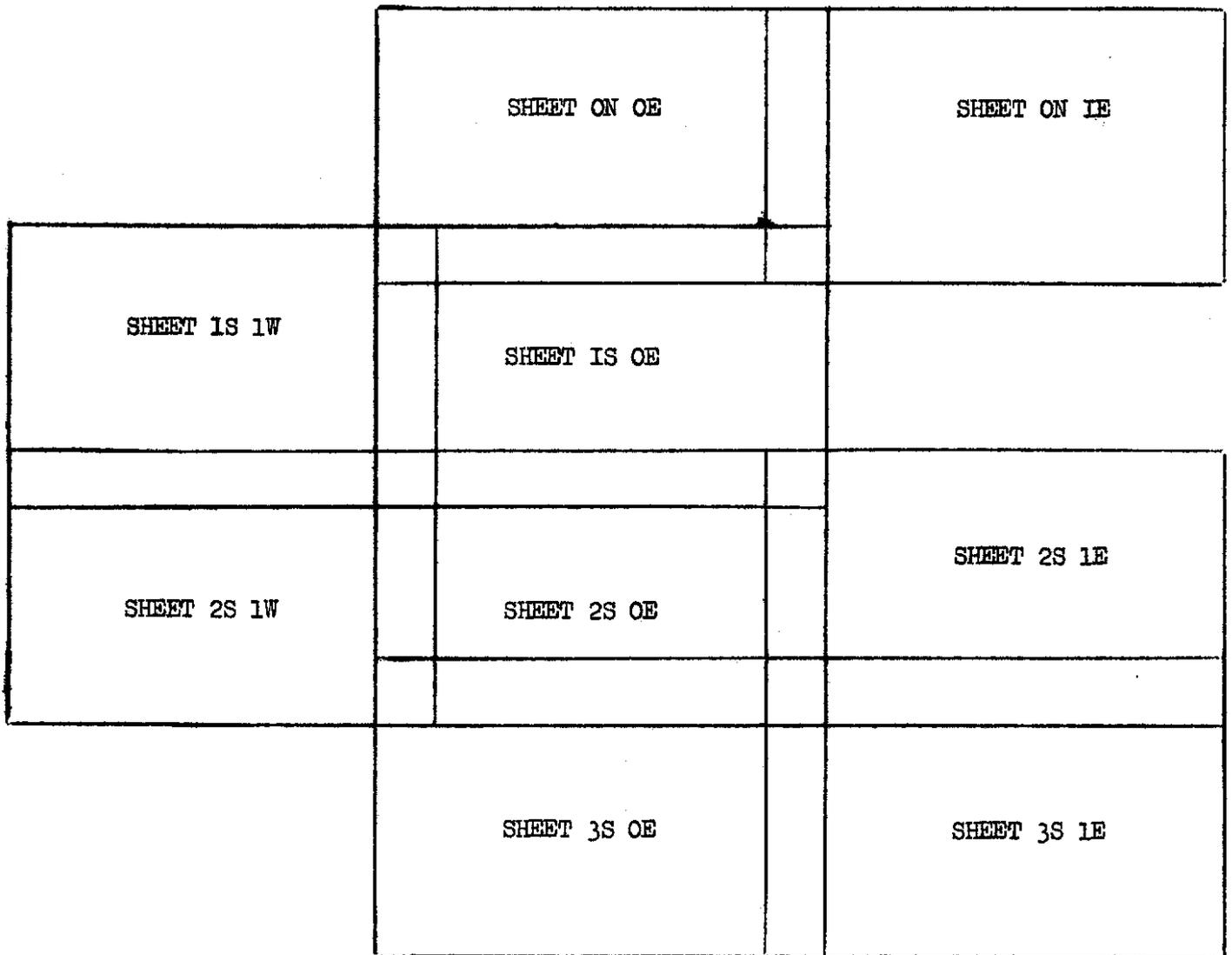
LIST OF DRAWINGSDrawing No.

L68-1	Interpretive Geological Map and Section of Mt. Lindsay-Wilson River Region.
L68-2	Geological Interpretation Plan.
L68-3	Geological Fact Plan : Sheet ON OE.
L68-4	" " " : Sheet ON 1E.
L68-5	" " " : Sheet 1S 1W.
L68-6	" " " : Sheet 1S OE.
L68-7	" " " : Sheet 2S 1W.
L68-8	" " " : Sheet 2S OE.
L68-9	" " " : Sheet 2S 1E.
L68-10	" " " : Sheet 3S OE.
L68-11	" " " : Sheet 3S 1E.
L68-12	Geological Interpretation Section.
L68-13	Topographic and Geophysical Profiles West of Mt. Lindsay Camp.
L68-14	Topographic and Geophysical Profiles East of Mt. Lindsay Camp (Lines 12E, 14E, 16E).
L68-15	Topographic and Geophysical Profiles East of Mt. Lindsay Camp (Lines OE, 4E, 8E, 10E).
L68-16	Geophysical and S.P. Profiles on lines to Diorite East of Mt. Lindsay Camp.
L68-17	Topographic and Geophysical Profiles on Stanley-Lindsay Baseline (Lines 72E, 68E, 64E).
L68-18	Topographic and Geophysical Profiles on Stanley-Lindsay Baseline (Lines 56E, 60E).
L68-19	Topographic, Geophysical and S.P. Profiles on Line 84E.
L68-20	Geophysical Profile over Lindsay Orebody on Line OE.
L68-21	Geochemical contours for Sn. Sheet ON.OE.
L68-22	Geochemical contours for Cu. Sheet ON.OE.

NB: ALL PLANS MISSING FROM REPORT

MAP SHEET LAYOUT

"GEOLOGICAL FACT PLAN" SHEETS (Scale 1" = 100')



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ABERFOYLE

TIN

M^r LINDSAY AREA

140029

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

DO NOT WRITE IN THESE SPACES
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21
ANSWERED
DEPT. OF MINES
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SUPPLEMENTARY REPORT ON THE MOUNT LINDSAY

AREA

by

ADRIAN JESSUP

MICROFILMED

MARCH 1968.

A. INTRODUCTION

As a result of the summer field programme (1967-1968) undertaken by Eshuys and Etheridge in the Mount Lindsay area a completely new interpretation has been placed on the geology of the Mount Lindsay orebody. As well as reinterpreting the geology, their work has outlined four anomalous zones parallel to the known orebody. A full description of their findings and conclusions is given in their report, as well as a list of recommendations for further work at Mount Lindsay. This supplementary report cover some of the recommendations.

The geology and exploration procedures have already been described by Eshuys and Etheridge. Also their nomenclature of rock types has been used in this report.

B. DETAILED GEOLOGY AND GEOPHYSICS

1. Anomaly 2.

During the present field trip a base line was cut along Anomaly 2. Traverse lines were then cut at right angles to this base line. Anomaly 2 can be traced by magnetometer survey from S-E Creek to the Meredith Granite. Either outcrop or floaters of lode chert are found over the entire length of the anomaly. Magnetite was found outcropping and as floaters at several localities, chalcopyrite and pyrrhotite are relatively common and cassiterite was found near O'Brien's adit and near the line 4E.

Eshuys and Etheridge have pointed out the similarity of Anomaly 2 to the known orebody. The magnetometer traverses done also show a similarity to magnetometer traverses over the known orebody. Both are of the same scale and both show considerable variation in different magnetic profiles.

The western limit of anomaly 2 can be defined precisely as the outcrop of the Meredith Range Granite. However to the east the anomaly appears to die out rather abruptly across S-E Creek. It is suggested that this sudden dying out of the anomaly may be due to faulting along the course of S-E Creek.

Between survey stations 6 and 7 a granite body outcrops poorly. It is an irregularly shaped body and rather variable in composition and nature. It contains fine grained aplite, biotite granite and porphyritic micro-granite. It possibly represents the intrusion of a stock into the Anomaly 2 area.

2. Western Extension of the Known Orebody

The western extension of the known orebody was investigated by scrubbing out the Mount Lindsay base line and cutting cross lines.

The orebody outcrops very well in News Creek where extensive workings have been dug into gossans and lode chert. The orebody can be traced as a prominent magnetic anomaly to line 29W. At 30W no trace of the orebody was found.

Granite (both biotite and tourmaline rich varieties) outcrop roughly parallel to the orebody but a few hundred feet to the north. This granite probably intersects the orebody at a couple of hundred feet depth, thus detracting from the importance of this western extension. At 30W the granite probably intruded the lode horizon.

Because of the limitations of time, the additional magnetometer traverses on the western extension of the main lode zone have not been surveyed, reference the Mount Lindsay grids. This should be done at the first opportunity when field operations are renewed.

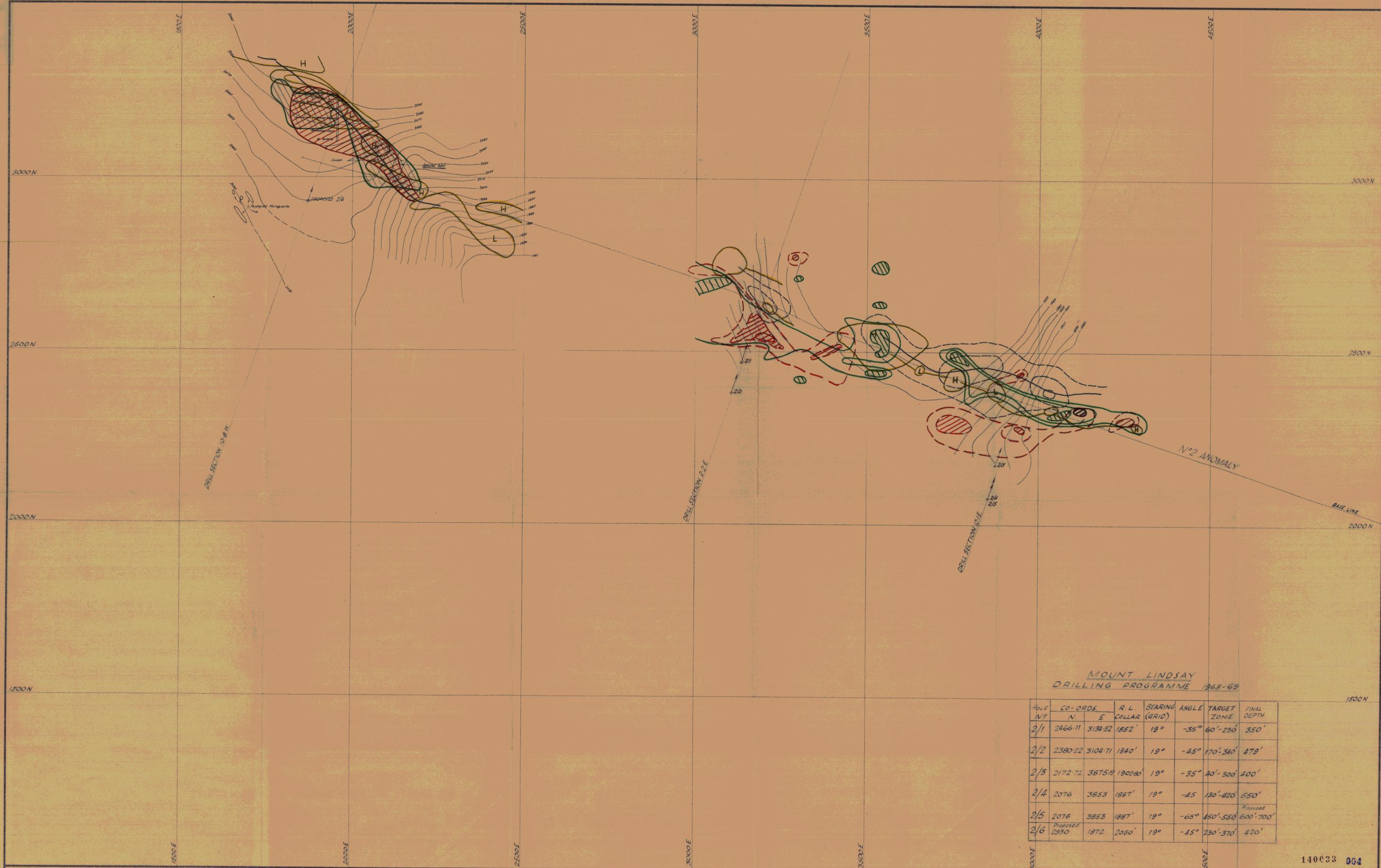
3. Stanley Base Line

Lines 52E and 44E have been cut out. A magnetometer and geochemical survey along line 44E. No magnetic anomaly was detected over this line at all. Much more work is needed to determine the extension of Anomaly 4.

C. NOTE ON THE GEOLOGICAL STRUCTURE AT MOUNT LINDSAY

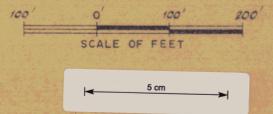
Eshuys and Etheridge have interpreted the structure of the Mount Lindsay orebody as one caused by repetition of a favourable bed by axial plane faulting. In their report they describe this faulted lode horizon as dipping steeply north.

The writer is of the opinion that the lode horizons dip to the south. This is corroborated by the fact that almost all outcrops dip to the south. Similarly drilling of the known orebody has shown that this is dipping steeply south. This matter requires resolution before drilling is planned.



MOUNT LINDSAY
DRILLING PROGRAMME 1968-69

HOLE NO.	CO-ORDS.		R. L. COLLAR	BEARING (GRID)	ANGLE	TARGET ZONE	FINAL DEPTH
	N	E					
2/1	2466.11	3134.52	1852'	19°	-35°	60'-230'	350'
2/2	2380.22	3104.71	1840'	19°	-45°	170'-340'	479'
2/3	2172.72	3875.19	1902.80'	19°	-35°	40'-500'	400'
2/4	2076	3853	1887'	19°	-45	130'-420'	550'
2/5	2076	3853	1887'	19°	-65°	450'-550'	Proposed 600'-700'
2/6	Proposed 2930	1872	2050'	19°	-45°	230'-370'	420'



LEGEND
 SELF POTENTIAL ANOMALY
 MAGNETIC ANOMALY > 5000x
 TIN ANOMALY > 200 ppm
 COPPER ANOMALY > 400 ppm
 TOPOGRAPHICAL CONTOURS

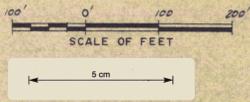
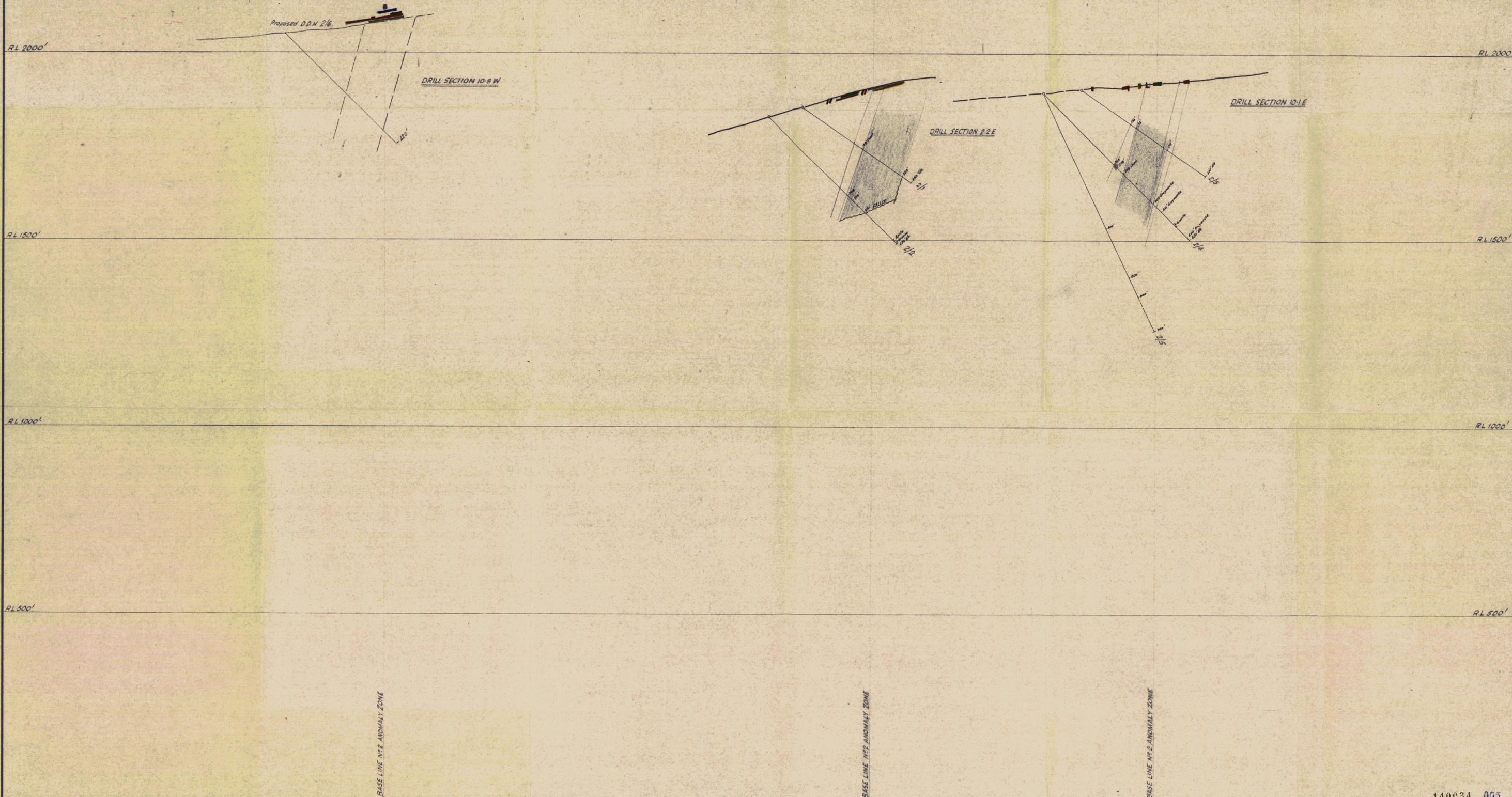
YELLOW
 RED
 GREEN

MOUNT LINDSAY
ANOMALY NO 2
PLAN OF DRILLING LAYOUT

FIG A

140033 004

SURVEY - / /
 GEOLOGY - / /
 ENGINEERING - / /
 DRAWN - C.L. BOYD - 11 / 2 / 69
 TRACED - / / /
 REFERENCE - / / /
 PRINT No. - / / /
 DRAWING No. - / / /
 DRAWER: - / / /



LEGEND
 — MAGNETIC ANOMALY YELLOW
 — GEOCHEMICAL ANOMALY FOR TIN RED
 — GEOCHEMICAL ANOMALY FOR COPPER GREEN
 — GEOCHEMICAL ANOMALY FOR ARSENIC BLUE
 — TREND FOR S.P. ANOMALY

MOUNT LINDSAY
 ANOMALY No 2
 DRILL SECTIONS
 (LOOKING W.N.W.)

FIG B

140034 005

SURVEY - / /
 GEOLOGY - / /
 ENGINEERING - / /
 DRAWN - C.L. BOYD - 12/2/69
 TRACED - / /
 REFERENCE - / /
 PRINT No. -
 DRAWING No. -

DRAWER: