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68-491

REPORT
ON
GEOPHYSICAL SURVEY
AT LINDA VALLEY, TASMANIA
FOR
PLACER EXPLORATION LIMITED
BY
J. HORVATH

GEOPHYSICS

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1. SURVEY OPERATIONS.

After an inspection of the Linda Valley area by the writer, together with your Senior Geologist Mr. G. Wilson, a reconnaissance survey was recommended using mainly the Self Potential Method.

A grid was recommended with 4 traverses 800 feet apart to cross Linda Valley from Owen Conglomerates in the North to the Owen Conglomerates in the South. These traverses each about 5000 feet long, were first pegged with pegs every 50 feet, surveyed and levelled. Plate 2 shows the geophysical grid and topographical features on a scale 1 inch equals 200 feet. Topographical contours are drawn with a contour interval of 50 feet.

The map has been made for the purpose of the geophysical survey and the features shown are mainly determined by their intersections with the traverse lines. In between lines the positions are merely estimated and not actually surveyed.

Mr. J. Jackson left Melbourne on 16th July, to Devonport with a Land Rover and equipment, and arrived in Queenstown on Saturday 17th evening. Fieldwork commenced on Monday 19th July, and terminated on 17th August. The party returned to Melbourne on Friday 20th. Twenty eight and a half working days were spent on the fieldwork. Two untrained field assistants were supplied by Placer Exploration Limited, and worked all the time with the party including weekends. The time needed for the survey had been estimated at 24 working days, but the terrain was more deeply dissected and pegging of traverses took slightly longer than anticipated. Also a few short intermediate traverses were added in order to be able to interpret the results.

The writer visited the party from 10th to 13th August, and had at that occasion, discussions with your geologists about the progress of the survey.

2. GEOLOGY

Although Linda Valley is so near the mines of Mt. Lyell, the geology in the area of lease S.P.L.6 is somewhat different. Plate 1. gives a portion of the geological map by M.L. Wade and M. Solomon of the Mt. Lyell Mining Company, covering Linda Valley and the surrounding area.

The thick conglomerate beds of the upper, middle and lower series of Owen Conglomerates of Ordovician age become more fine grained in the Upper Series and are there largely replaced by sandstones. The Owen Conglomerates are overlain by shales and impure limestones of the Gordon Limestone Group. These shales and limestones fill the centre part of the lease area, but are to a large extent covered by quaternary glacial moraine. The weather resisting conglomerates form the mountains on both sides of the Valley, with Mt. Lyell on one side and Mt. Owen on the other. The soft shales and limestones form the depression in the valley and are largely covered by marsh. As the mountain slopes are covered by scree from above, there are not many good outcrops in the lease area.

The Mt. Lyell copper deposits occur in a wide N-S trending zone east of Queenstown and seem to be developed where the N-S zone meets W.N.W. striking crossfaults. The most important of these faults is the North Lyell Fault Zone which crosses into the northern part of the lease area. Some copper gold mineralisation is known from near this fault zone in the lease area. Several W.N.W. faults have also been observed near Gormanston, and are known as Linda fault zone.

The Mt. Lyell copper deposits occur in the Mt. Lyell schists, which are altered Mt. Reid Volcanics and probably of Cambrian age. Most of the deposits occur adjacent to the steeply dipping Owen Conglomerates and form rather massive lenses of pyrite and chalcopyrite in a wider zone of disseminated sulphides consisting nearly only of pyrite.

Loftus Hills reported zinc mineralisation in the area and a Zinc Reward claim had been granted in the ~~area~~ area of SPL6.

Not much is known about the zinc mineralisation, except that it occurred mainly in an area south of the Queenstown - Hobart road, which is covered largely by glacial debris. But as the zinc cannot originate in the quaternary beds, it must have derived from the Gordon limestone underneath. However, little mineralisation is known from the Gordon limestone formation in other parts of Tasmania. The only lead zinc mine worked in the Mt. Lyell area was the Tasman mine, which was about 800 feet east from the Comstock mine and north of the Mt. Lyell Range. The steeply dipping orebody occurs in Mt. Lyell schists close to the contact with Owen Conglomerates.

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3. THE SELF POTENTIAL SURVEY.

The Self Potential method had been used before in surveys carried out by the Bureau of Mineral Resources for the Mt. Lyell Mining Company. It had been checked by diamond drilling, but was mainly used in combination with other methods, especially the electromagnetic method.

The electromagnetic method however, cannot be used in large parts of Linda Valley because pipelines to houses in the area, powerlines and telephone lines, interfere more seriously with this method than with Self Potential surveys.

In the Self Potential survey in Linda Valley, a transistorized S.P. meter with a very high input resistance was used, so that the contact resistance of the forward nonpolarising electrode which varied enormously from one point to the next, could be eliminated as source of error. The S.P. values at all points are in reference to a base station, which was situated near traverse zero at 560 south. A wide area around Mt. Lyell mine is affected by stray currents caused by underground railway trains, used for ore transport. A DC mV Recorder was used to record the stray currents which usually did not exceed 10 mV, but slowed down observations. Occasionally much larger stray currents were observed, probably caused by switching operations in the smelter or by a welding generator. Fortunately these large variations lasted only about $\frac{1}{4}$ hour, but our observations had to be stopped during this time, so as not to introduce any errors in our readings.

To avoid effects from corroding metal pieces in the inhabited area, 3 readings were taken on each observation point with the electrode moved about one to two feet between readings.

Although rain and fog sometimes made working conditions rather difficult, no working day was lost because the instruments had been made waterproof.

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4. RESULTS OF THE S.P. SURVEY.

The results of the S.P. survey are shown on Plates 2,3 and 4. Plate 3 shows the results in form of profiles, using a horizontal scale of 1 inch equals 200 feet and a vertical scale 1 inch equals 50 mV. This large vertical scale was used because it allows to observe more details and because usually smaller S.P. anomalies are observed with zinc than with copper deposits.

Changes in soil type and vegetation can cause small variations of about 5-20 mV and with the use of a sensitive scale, the profiles are more rugged and less smooth than with the mostly used scales of 1 inch equals 100 or 200 mV. Plate 4 shows the results as contours of equal potentials, but it should be understood that with the large distances of up to 800 feet between traverses, the contour plan might change if a more detailed survey had been carried out.

On Plate 2, the S.P. anomalies are shown and classified as (strong), medium, weak and very weak.

The S.P. Anomalies in the surveyed area are usually much weaker than those observed in B.M.R. surveys, for instance in the Glen Lyell or Corridor areas of Mt. Lyell, but weaker anomalies would also have to be expected with zinc, than with copper mineralisation. Only some high negative values increasing with elevation were observed, mainly on the northern end of the traverses on the steep slopes over the Owen Conglomerates of Mt. Lyell. S.P. values gradually increased and reached 1340 mV on the highest point of traverse zero at 2900N, at an elevation of nearly 1000 feet above the valley. The same phenomenon has been observed in previous surveys for Mt. Lyell Mining Company, especially on the slopes of Mt. Lyell itself. While the influence of the topography cannot be excluded even on other parts of the Linda Valley, these influences of topography have only been observed/in other parts of Tasmania and for instance are not observed in the Zeehan or Dundas areas, even on slopes as steep as those on Mt. Lyell.

In any case if S.P. anomalies coincide with mountain ridges, they could be suspected to be due to topography, especially if the S.P. profile shows a similar character to the topographic profile.

Where such a topographic steep gradient exists as at the north end of the profiles, no reliable interpretation can be made because no corrections can be applied to the field observations, because the origin of the topographic influence is not known. Anomalies such as 2400W/1800N, 3200/1850N, 800W/2400S, 1600W/2500S could be due to the topography, although also in the Mt. Lyell area in the Corridor, Glen Lyell, Great Lyell, no terrain influence was noticed, although the topography is more mountainous than the relatively gentle slopes east of Gormanston.

The most important zone of S.P. anomalies seems to be one extending from 3200W/750N to zero/700N. This zone of anomalies continues more or less distinct right through, and although it is usually weaker than 100 mV, its extent should be of interest, especially as it certainly is not due to topography. In the western part, the anomaly is accompanied by a second one about 200 feet distant to the north. This zone of anomalies seems to be the best prospect in the area,

because of its extent, but the anomalies do not indicate a single massive body, but are more probably caused by a mineralized zone with more mineralized parts interrupted by more barren portions. Whether the S.P. anomalies are due to copper, zinc or only pyritic mineralization, cannot be seen from the geophysical results.

The use of a second geophysical method would have been advisable in the assessment of this anomalous zone, especially the e.m. method, but this cannot be used in the western part of the zone.

It was hoped that signs of copper mineralization might be found in the area where the North Lyell Tear fault crosses the northern part of the traverses, especially as an old open-cut and some adits exist near traverse 1600W/2000N. Unfortunately, only isolated and not promising anomalies were found in this area, which do not indicate any copper deposits of economic interest.

Another zone of S.P. anomalies is found on the slopes east of Gormanston. Although topographical influence cannot be quite eliminated, especially on traverses 1600W/2500S and 800W/2400S, anomalies are also found on traverses 2400W and zero. The S.P. anomalies on traverses 2400W and zero, originate nearer the surface. A few additional S.P. profiles would probably help in assessing the merit of this zone and perhaps even by trenching and geological work lead to the cause of the anomaly in one of the deeply eroded creeks.

Two zones of very weak S.P. anomalies are plotted on Plate 2, the northern one between 1400W/1100S and 2400W/425S, the southern one between 1800W/1175S and 2400W/1100S. The first of these coincides with some gossan, the second with some quartz blows. The anomalies are quite shallow and very weak and not promising. The anomalies are best on traverse 2400W and might improve to the west, but are here probably too close to the lease boundary to be worth following.

5. GEOCHEMICAL SURVEYS.

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Soil samples for geochemical assays were taken over short sections of 4 traverses. The samples were taken 25 feet apart, but at least 10 feet from S.P. observation points, so that no error could be introduced from the copper sulphate in the nonpolarising electrodes used in the S.P. Survey. 86 soil samples were taken and 85 assayed for total copper and zinc (one sample was spilled). The results are given in the appendix to the report.

The relatively few samples were taken as a test only to assess the value of geochemical work in this area, because the fumes of the Mt. Lyell smelter had for a long time occasion to contaminate a wide area around it. Copper values were expected to have a much higher background than is usual, and a rather irregular distribution, depending upon local conditions for deposition from the fumes. The samples were taken by spade from a depth of about 1 foot. Attempts to take the samples by auger from larger depths had to be given up because large pieces of rock prevented to make progress with the auger, especially in the glacial deposits and in the marshy ground.

The sections where the samples were taken are shown on Plate 2. The samples were taken at the end of the geophysical survey, but very wet weather hampered the work and the difficulties caused by rock pieces slowed the progress, so that not all samples were taken, which we intended to take because the booking for the return trip of the Land Rover on the boat to Melbourne had already been made. It was intended to sample traverse 2400W further downhill another 400 feet, because with the S.P. anomaly at 1800N, one could expect higher copper values downhill than above 1800N. We intended also to take samples on some sections in the south of traverse 2400W and near the anomaly at 2200S on traverse zero.

The zinc assays show very consistent low zinc values of about 10 ppm which can be generally accepted as normal background. The rather different types of soil (glacial debris, gritty sand, peat marsh, clays) do not seem to influence these values to any extent. Also more erratic values due to contamination in the inhabited area were expected, but were not found. But one important result of the zinc assays was the big anomaly at traverse 2800W/950N which coincides approximately with the S.P. anomaly on that traverse, and is the more northern of the two anomalies of the zone of anomalies discussed in the chapter "results of S.P. survey". The zinc anomaly is of a type as one would expect. It rises very sharply from the low background values of about 10 ppm to its maximum of 2500 ppm, and decreases gradually downhill to 750 ppm, 270 ppm, 125 ppm, to 36 ppm at 850N. Such an anomaly is typical for a very shallow source. The zinc anomaly is accompanied by a much weaker copper anomaly and should be of some significance especially because it lies in the rather extensive zone of S.P. anomalies described previously. But the zinc assays of the section sampled on traverse zero between 400N and 900N, which covers the eastern end of the zone of S.P. anomalies, did not rise above background values. On the other hand, the copper values in this section are higher (about 300 ppm) than in other sampled sections, but they are more irregular, and do not show a well defined anomaly.

I want to mention also, the geochemical results on the section of traverse 14W, which was sampled, because signs of mineralization mainly pyrites in black shales were found in two small gullies on traverse 14W, 16W and 18W. Only a very small rise in zinc values was observed, south, 135, but a more pronounced rise in copper. The S.P. anomalies in this area are very weak and indicate a source with small extent in depth.

Because the geochemical sampling was confined to 4 short sections, only limited conclusions can be drawn, regarding the value of geochemical work in the Linda Valley lease area. Contamination by fumes from the copper smelter, corrosion products and refuse in the inhabited area, certainly introduce considerable sources of error, and limit the value of geochemical work.

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6. CONCLUSIONS & RECOMMENDATIONS

An area about 3000 feet in an east-west direction and about 5000 feet in a north south direction, was investigated by some widely spaced traverses. The S.P. method was used solely in the investigation, because pipelines, powerlines and telephone lines prevent the use of the electromagnetic and the I.P. method over a large part of the area.

Previous surveys by the B.M.R. for the Mt. Lyell Mining Company have shown that the S.P. method in most cases has given as good results as the electromagnetic and I.P. methods, which need more equipment and staff, and are therefore more expensive than S.P.

No anomalies indicating a large, massive orebody (like Corridor or North Lyell) were found in the area of the North Lyell Tear fault, which crosses into the area of the Linda Valley lease, and which proved important for the location of copper orebodies west of the lease area.

The Self potential survey showed two rather extensive zones of anomalies, one at about 7N to 9N extending from the western to the eastern end of the surveyed area. The second zone in the south too, is probably rather extensive, probably extending from traverse 2400W/2150S to traverse zero 2250S. But it is rather dangerous to connect anomalies which are 800 feet apart and the above postulation of the extensive zone has to be taken with some caution. The anomalies especially on traverses 1600W and 2400W are rather wide and either are more deep seated or due to a rather wide zone of disseminated sulphides. A third zone between 2400W/2750S, 1600W/3100S, 800W/3025S and zero/3425S is somewhat weaker than the one just mentioned, but is on the two western traverses better defined.

The zone at 700N-900N is probably easier to investigate than the zones in the south and there seems also a confirmation by the geochemical samples taken on traverse 2800W, which show a good zinc anomaly. But although this zone seems to be rather extensive, the anomalies do not indicate a large massive orebody, but are probably caused by a more or less mineralized lode or shear zone interspersed with more barren stretches.

It is recommended to investigate this zone geologically in detail, but at the same time some short intermediate S.P. profiles and additional geochemical sampling in this zone, should be of considerable assistance in selecting suitable places for trenching, before drilling is contemplated.

The survey at present is still too much at the stage of reconnaissance to recommend already some drilling targets, but it seems easier to investigate this zone by trenching, mapping and some additional geophysical and geochemical work than the zones further south where geological mapping is probably more handicapped. On traverses 2400W and zero, the anomalies are caused by sources closer to surface, and it is therefore recommended to pay attention mainly to the areas covered by traverses 2400W and zero, and perhaps disclose some favourable spots for trenching etc., by laying a few additional traverses with distances of 100 or 200 feet between them and do also some geochemical sampling.

Some traces of mineralization were found in gullies between traverses 1400W and 2000W. These seem to coincide with two zones of very weak S.P. anomalies and these do not indicate any depth extent. While the anomalies improve slightly towards

CONCLUSIONS & RECOMMENDATIONS cont'd

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west, the geophysical evidence is not encouraging for this special area and the western extension is already near the western lease boundary.

I believe the next stage of exploration consisting of detailed geological mapping accompanied by some trenching, a few additional S.P. profiles in the interesting areas with closer spacing between traverses than used in reconnaissance, and supported by geochemical sampling, could be done relatively quickly and with costs not exceeding £1000. As outcome of this, a geological and geophysical report should be able to assess whether the prospects are good enough to enter the third and more expensive next stage of exploration, which would include also diamond drilling.

J. Smith

APPENDIX

GEOCHEMICAL ASSAYS

012

TRAVERSE 00

<u>SAMPLE NO.</u>	<u>POINT NO.</u>	<u>ppm Cu</u>	<u>ppm Zn</u>
46.	400N	225	8
47.	425N	222	12
48.	450N	205	8
49.	475N	300	9
50.	500N	310	8
51.	525N	245	8
52.	550N	222	11
53.	575N	137	15
54.	600N	235	10
55.	625N	70	22
56.	650N	220	8
57.	675N	235	12
58.	700N	318	11
59.	725N	275	9
60.	750	300	9
61.	775	232	8
62.	800	237	9
63.	825	350	18
64.	850	237	9
65.	875	375	15
66.	885	230	8
67.	900N	195	10

011

TRAVERSE 1400 W.

<u>SAMPLE NO.</u>	<u>POINT NO.</u>	ppm <u>Cu</u>	ppm <u>Zn</u>
21.	900S	137	25
22.	925S	200	10
23.	950S	300	9
24.	975S	100	10
25.	1000S	75	8
26.	1025S	72	9
27.	1050S	228	8
28.	1075S	100	18
29.	1100S	N/S	N/S
30.	1125S	118	11
31.	1150S	205	11
32.	1175S	185	33
33.	1200S	170	15
34.	1225S	225	9
35.	1250S	50	9
36.	1275S	125	15
37.	1300S	222	12
38.	1325S	350	32
39.	1350S	76	26
40.	1375S	300	11
41.	1400S	225	25
42.	1425S	325	22
43.	1450S	400	24
44.	1475S	410	12
45.	1500S	410	18

013

TRAVERSE 2400 W.

<u>SAMPLE NO.</u>	<u>POINT NO.</u>	<u>ppm Cu</u>	<u>ppm Zn</u>
68.	2200N	35	7
69.	2175N	32	12
70.	2150N	15	9
71.	2125N	158	11
72.	2100N	18	9
73.	2075	210	11
74.	2060	13	8
75.	2050	12	11
76.	2025	35	8
77.	2000N	25	9
78.	1975N	83	8
79.	1950	250	20
80.	1925	38	9
81.	1900	76	15
82.	1875	222	24
83.	1850	76	8
84.	1825	195	24
85.	1800N	70	17
86.	1775	95	12

010

TRAVERSE 2800 W.

<u>SAMPLE NO.</u>	<u>POINT NO.</u>	<u>ppm Cu</u>	<u>ppm Zn</u>
1.	500N	76	22
2.	525N	215	17
3.	650N	180	22
4.	675N	130	36
5.	700	40	22
6.	730	48	25
7.	780	20	75
8.	800	76	675
9.	825	76	80
10.	850	25	36
11.	875	45	125
12.	900	32	270
13.	925	43	750
14.	950	118	2500
15.	975	195	75
16.	1000	40	9
17.	1025	25	12
18.	1050	78	62
19.	1075	32	11
20.	1100	108	36

LEGEND

QUATERNARY	Q	TALUS, ALLUVIUM Etc.
	Qp	MORaine WITH VARIED CLAYS
ELOONG GROUP SILURIAN	Sc	CROTTY QUARTZITES
	s	
JUNEE GROUP ORDOVICIAN	Og	GORDONIAN LIMESTONE DARK BLUE GRAY ARGILLACEOUS
	Oou	UPPER OWEN CONGLOMERATE
	Oom	MIDDLE OWEN CONGLOMERATE
	Ool	LOWER OWEN CONGLOMERATE
DUNDAS GROUP CAMBRIAN	C	GREYWACKE CONGLOMERATE
	S	MINERS SLATE FINELY BONDED SILTSTONES

GEOLOGICAL BOUNDARIES

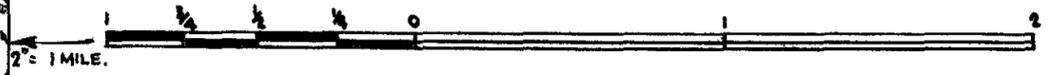
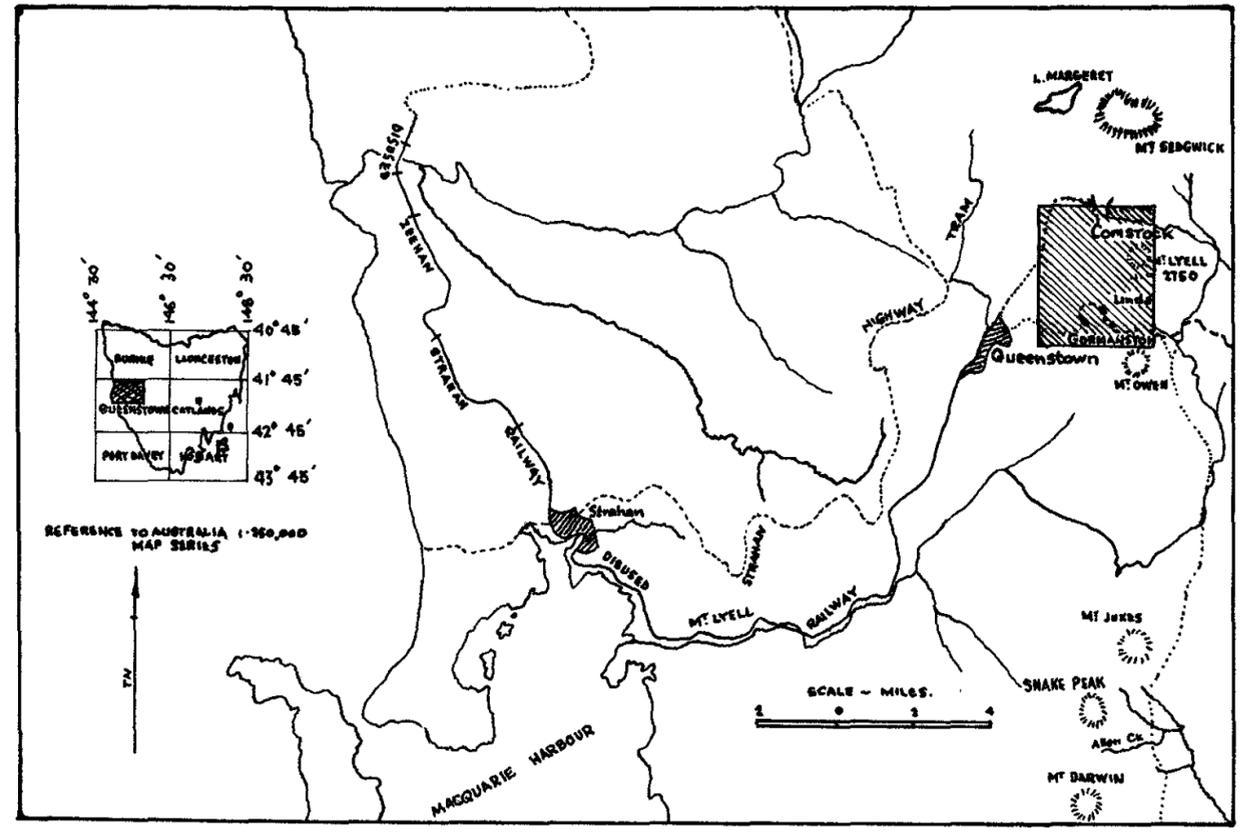
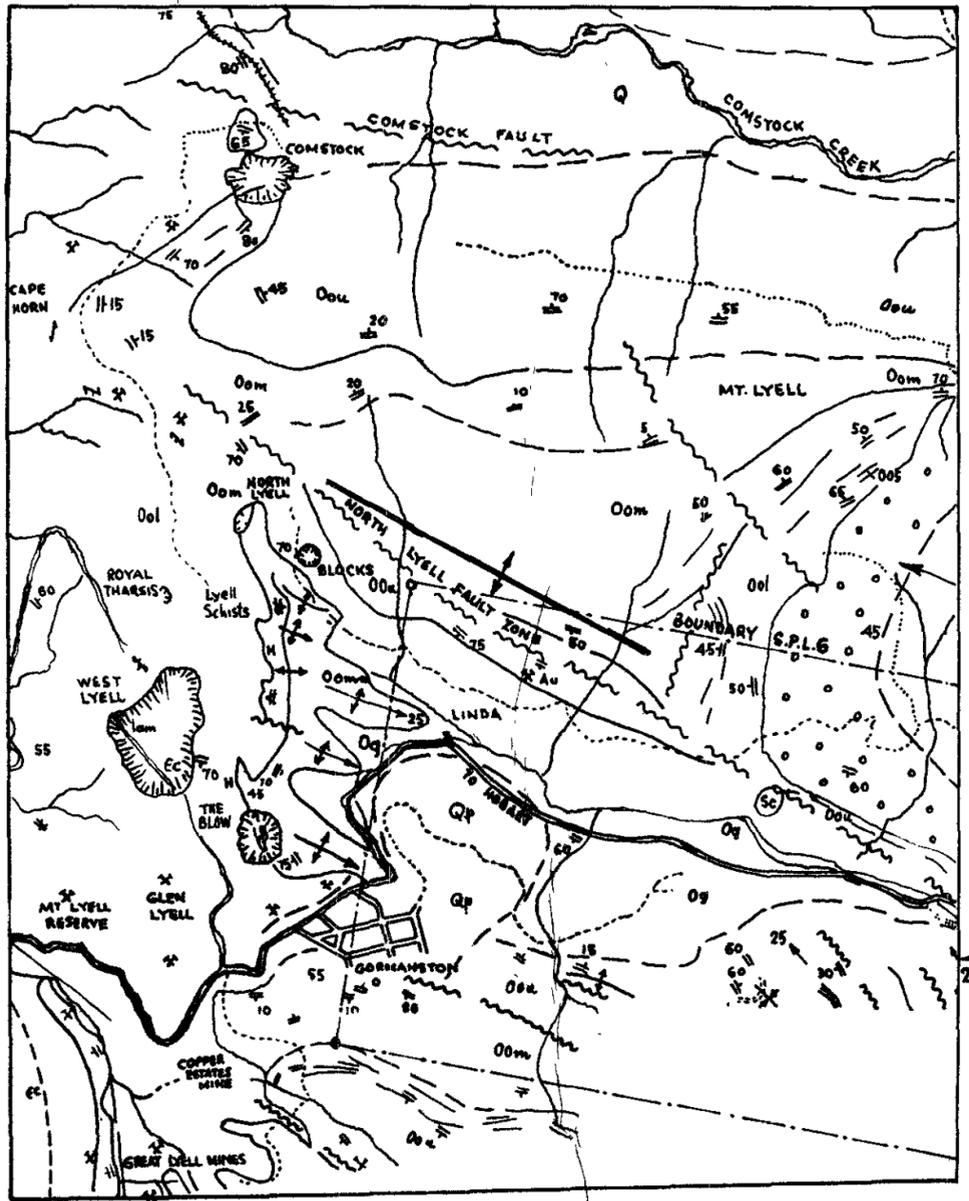
- OBSERVED
- - - APPROXIMATE
- ? - DOUBTFUL

FAULTS

- OBSERVED
- - - APPROXIMATE

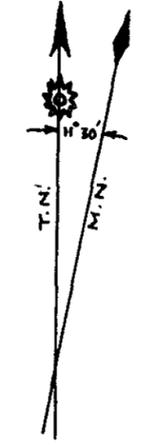
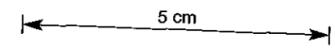
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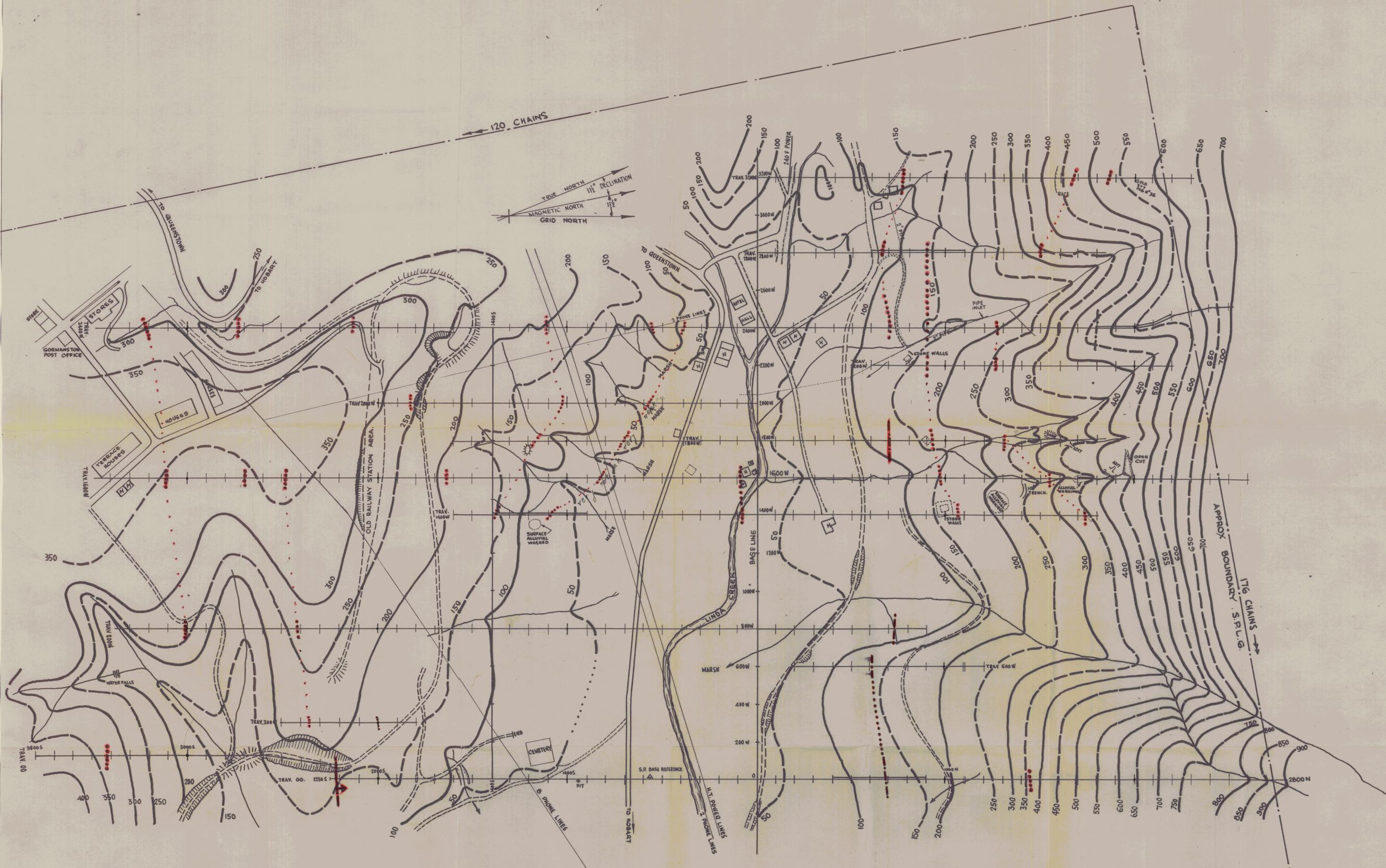
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|--|----------------|-------|--------------------|
| | STRIKE AND DIP | — | MAIN ROAD |
| | VERTICAL | - - - | VEHICULAR TRACK |
| | HORIZONTAL | - - - | FOOT TRACK |
| | OVERTURNED | - - - | RAILWAY OR TRAMWAY |
| | PITCH | - - - | RIVER OR CREEK |
| | SCHISTOSITY | - - - | OPEN CUT |
| | CLEAVAGE | - - - | OLD MINE |
| | SYNCLINE | | |
| | ANTICLINE | | |



PLACER EXPLORATION PTY LTD
 LINDA VALLEY, TASMANIA.
 (AFTER MT LYELL M & R Co LTD. QUEENSTOWN AREA GEOLOGICAL MAP)
LOCALITY & GEOLOGICAL MAP.

G.E.A. LABORATORIES. VICTORIA.





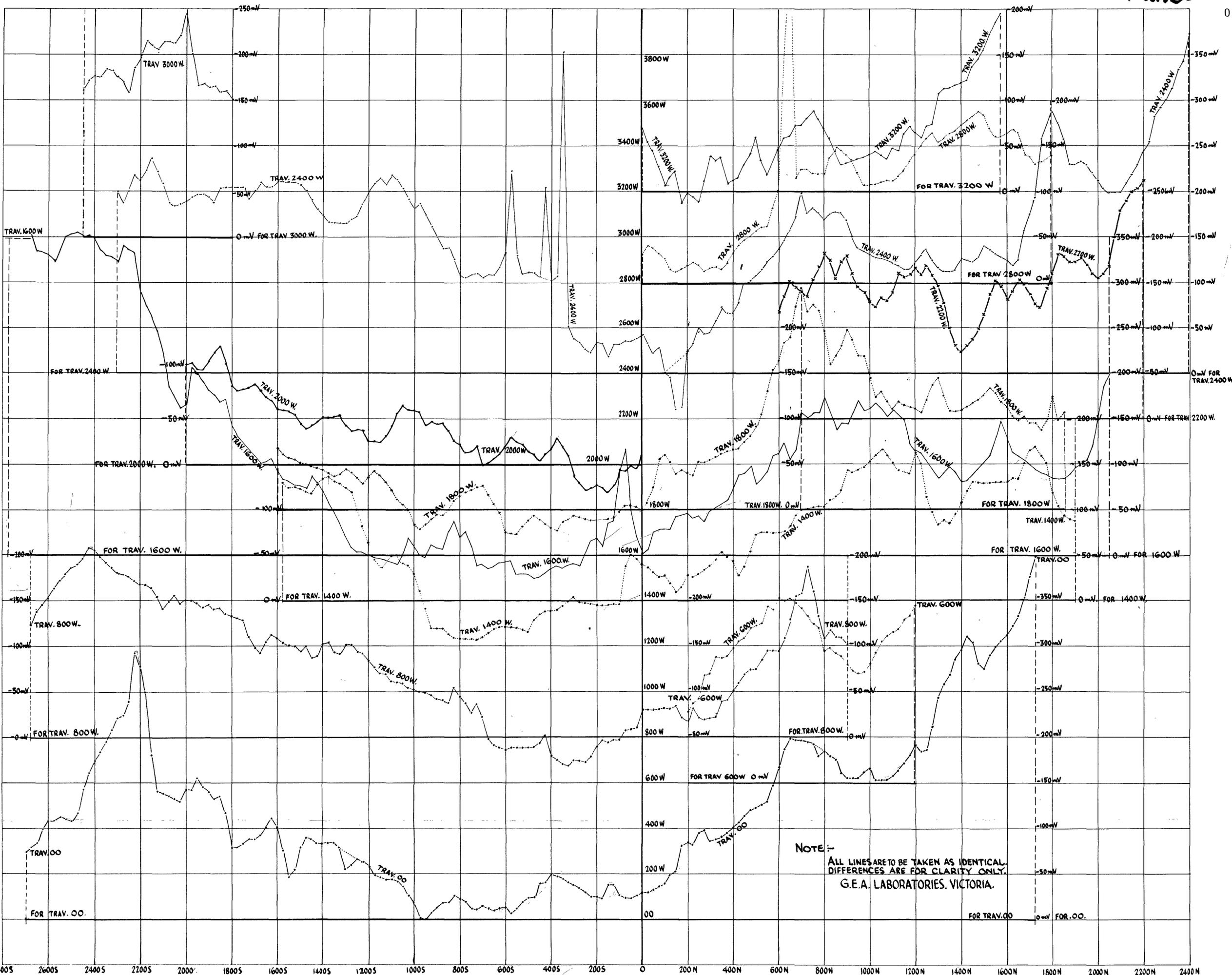
SELF POTENTIAL ANOMALIES
 ——— STRONG
 - - - - MEDIUM
 WEAK
 VERY WEAK

PLACER PROSPECTING PTY LTD
 LINDA VALLEY- TASMANIA.
 GEOPHYSICAL GRID AND TOPOGRAPHY.
 SCALE 1" = 200'

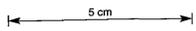


LEGEND:-
 - - - - - LEASE BOUNDARY (APPROXIMATE)
 - - - - - GEOPHYSICAL TRAVERSE AND PEGS
 - - - - - GEOCHEMICAL SAMPLES TAKEN
 - - - - - MAIN ROAD
 - - - - - ROAD
 - - - - - TRACK
 - - - - - OLD RAILWAY
 [] HOUSE
 [] OLD HOUSE
 [] PIPE
 [] TOPOGRAPHIC CONTOURS

G.E.A. LABORATORIES, VICTORIA.



PLACER EXPLORATION PTY LTD
 LINDA VALLEY, TASMANIA.
 SELF POTENTIAL PROFILES.
 SCALE - HORIZONTAL 1" = 200'
 " VERTICAL 1" = 50mV.





PLACER PROSPECTING PTY LTD
 LINDA VALLEY- TASMANIA.
 SELF POTENTIAL CONTOURS CONTOUR INTERVAL=25 mV
 SCALE 1" = 200'



- LEGEND -
- LEASE BOUNDARY (APPROXIMATE)
 - GEOPHYSICAL TRAVERSE AND PEGS
 - GEOCHEMICAL SAMPLES TAKEN
 - MAIN ROAD
 - ROAD
 - TRACK
 - OLD RAILWAY
 - HOUSE
 - OLD HOUSE
 - PIPE
 - SELF POTENTIAL ANOMALY.

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