000

974001

70-665

TASMINEX N.L.

NATONE COPPER/IRON PROSPECT, TASMANIA

by

HALL, RELPH & ASSOCIATES PTY. LTD.

18TH AUGUST, 1970

AMG REFERENCE POINTS ADDED

CONTENTS

HALL, RELPH & ASSOCIATES PTY. LTD.
GEOLOGICAL & EXPLORATION CONSULTANTS

L. R. HALL. M.Sc., M.A.A.P.G., M.Aus.I.M.M.
R. E. RELPH. B.Sc., M.Aus.I.M.M.

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TEL.: 29-5631

18th August, 1970.

TASMINEX N.L.

NATONE COPPER/IRON PROSPECT, TASMANIA

CONCLUSIONS

1. The soil geochemical programme has outlined an area of interest in the southwestern corner of the prospect, where copper values of the order of one hundred to two hundred parts per million, in soil derived from hornfelsic rocks, are widespread.

2. The abovementioned area coincides with a weak, north-south trending magnetic anomaly.

3. More detailed soil sampling should be undertaken at Rutherford's copper prospect.

4. A magnetic anomaly, centred on peg 34, JSS, appears to be caused by either a thickening of the basaltic cover, or by an extension of the anomaly due to the presence of haematite/magnetite bodies further to the east. No further investigation of the anomaly is warranted at this stage.

RECOMMENDATIONS

Moreddetailed sampling of the soil in the southwestern corner of the prospect is recommended, preparatory to carrying out an induced polarization survey to determine whether sulphide mineralization is present. A plan for the additional soil sampling is included with the appendix of this report.

More detailed soil sampling at Rutherford's copper prospect is also recommended.

GEOLOGY

The geology of the Natone area is documented in the Burnie 1:63,360 Geological Map. More detailed mapping at a scale of 1:31,680 was carried out during the current investigation when it became apparent that the existing geological map contained some discrepancies. The results of this mapping are recorded in the geological map in the appendix of this report.

Briefly, chert conglomerate of Ordovician age overlies Precambrian slate and quartzite of the Burnie series. Both units are intruded by granite of Devonian age. The entire sequence is overlain by Tertiary basalt.

During the present investigation a small outcrop of ferruginous grit was located, about one mile west of Natone Village. The grit has been assigned a Tertiary (pre-basalt) age on the basis of its lack of compaction or deformation. The granite has a well-defined contact aureole in the southwestern corner of the prospect. Several samples taken for thin sectioning revealed the following assemblages:

Quartz/hypersthene/muscovite
Cordierite/magnetite
Cordierite/cummingtonite/magnetite
Biotite/magnetite/quartz/hornblende

All of these assemblages are consistent with the contact metamorphism of chloritic slates and quartzites, and there would appear to be little justification for placing these rocks in a separate category from the Burnie Slate and Quartzite.

MINERALIZATION

Keunecke (1959) describes haematite/magnetite mineralization immediately southwest of Natone Village. He suggested the mineralization could be structurally controlled by a northeast trending shear zone. (The mineralization occurs in an area held by the Minops Group, and was not investigated by Hall, Relph and Associates Pty. Ltd.

Northwest of the village, a deposit of copper was prospected in the 1920's. The principal working here is held by the Minops Group, but there are several small workings in the area held by Tasminex. They consist of drives, shafts and costeans in barren ground for the most part. Two appear to have successfully intersected lodes, as the dumps were found to contain some pyritiferous quartz and one, the "Blue Lode" shown in the workings plan, contained a small amount of malachite-stained gossan. Neither group of workings is accessible.

The Blue Lode workings have been driven along a pyritiferous quarts vein in brecciated slate. Slickensided blue fault gouge is present on the dumps, suggesting that the lode is fault-emplaced. The width of the lode is probably only a few inches judging by the amount of lode material on the dump, and there appears to be little prospect of an economic copper occurrence being found here.

It is of interest to note that identical mineralization is found at the Copper Queen prospect, on the Blythe River near Wivenhoe.

Pyrite is widespread throughout the hornfelses in the southwestern corner of the prospect. It occurs principally as veinlets in the rock, although one floater of massive pyrite was found close to peg 8, ES. This was also the site of a relatively high soil copper determination, viz: 200 ppm.

GEOCHEMICAL AND MAGNETIC SURVEYS

Magnetometer readings were taken every fifty feet on traverses situated at two hundred feet intervals along the baseline. (See appendix for situation of the baseline). No appreciable instrument or diurnal drift was observed during the survey, and the readings are shown in plan and profile forms in the appendix of this report.

Soil samples were taken every 100 feet on alternate traverses (i.e. 400 feet apart.) Results considered to be anomalous and near-anomalous are shown. while the laboratory sheets are included for the rest of the determinations. The -80# fraction of each sample was analysed for copper only.

INTERPRETATION OF GEOCHEMICAL RESULTS

The survey outlined an area of interest in the southwestern corner of the prospect near the granite contact. Soil values of between 100 and 200 parts per million copper were widespread, extending over a zone measuring 2,800 feet by 2,000 feet. Normally, copper content of this order is considered anomalous depending on the rock type from which the soil is derived. Field examination showed the rock to be cordierite hornfels, probably derived from contact metamorphism of the Burnie Slate and Quartzite (see "Geology" for discussion of this) and since soils derived from the unmetamorphosed slate and quartzite do not display such anomalous values, it is quite likely that there has been an introduction of copper to hornfelses. The copper may either be concentrated into a recognisable lode, or it may be uniformly disseminated through the rocks in trace amounts.

Elsewhere within the prospect anomalous copper values are random, and can usually be explained by proximity to old mine dumps or workings. The mineralization at Rutherford's copper prospect is located between two traverses of the survey, viz: 74S and 78S, and more detailed sampling in this region is warranted.

INTERPRETATION OF MAGNETOMETER SURVEY

The magnetic profilesshow two anomalous regions, both trending north-south. These are depicted in contour form on the grid plan in the appendix.

The first anomaly is weak, and crosses the baseline at 8. It consists of a zone of smaller, disconnected anomalies with a linear disposition, and would not normally be of interest in further prospecting. However, the anomaly coincides with the region of anomalous soil copper values outlined above, and the anomaly could be a reflection of the presence of a weakly magnetic lode; for example, one which contains pyrrhotite.

The second anomaly is of greater magnitude and extent than the first, and lies in the vicinity of peg 34, JSS. The rock type is Tertiary basalt, and the anomaly could result from either or both of two features:

(i) A localised thickening of the basalt, or

(ii) An extension of the anomaly described by Keunecke (1959). Keunecke's anomaly was thought to be due to the presence of haematite/magnetite bodies.

Neither alternative warrants further investigation at this stage. The company is advised to await the result of the investigation of the southwestern anomaly before proceeding any further.

FUTURE INVESTIGATIONS

From the results obtained so far, it is evident that the zone of anomalous soil copper is poorly defined. It is not wise to assume that the copper lode, if it exists, is coincident with the magnetic anomaly. Consequently, it is proposed to sample the area more closely to determine the disposition of the mineralization and to resolve any separate centres that may be present. The results of this survey should be used to plan the lay-out of an induced polarization survey aimed at determining whether concentrated sulphide mineralization is present, and at delineating drilling targets.

It is also evident that the geochemical survey was too broad to provide coverage of Rutherford's copper prospect, and more detailed sampling is proposed in this area.

The expenditure required in a small programme such as this is considered to be warranted by the mineral potential of the prospect.

HALL, RELPH & ASSOCIATES PTY. LTD.

Per J. R. Whiting

JH/lz

REFERENCE

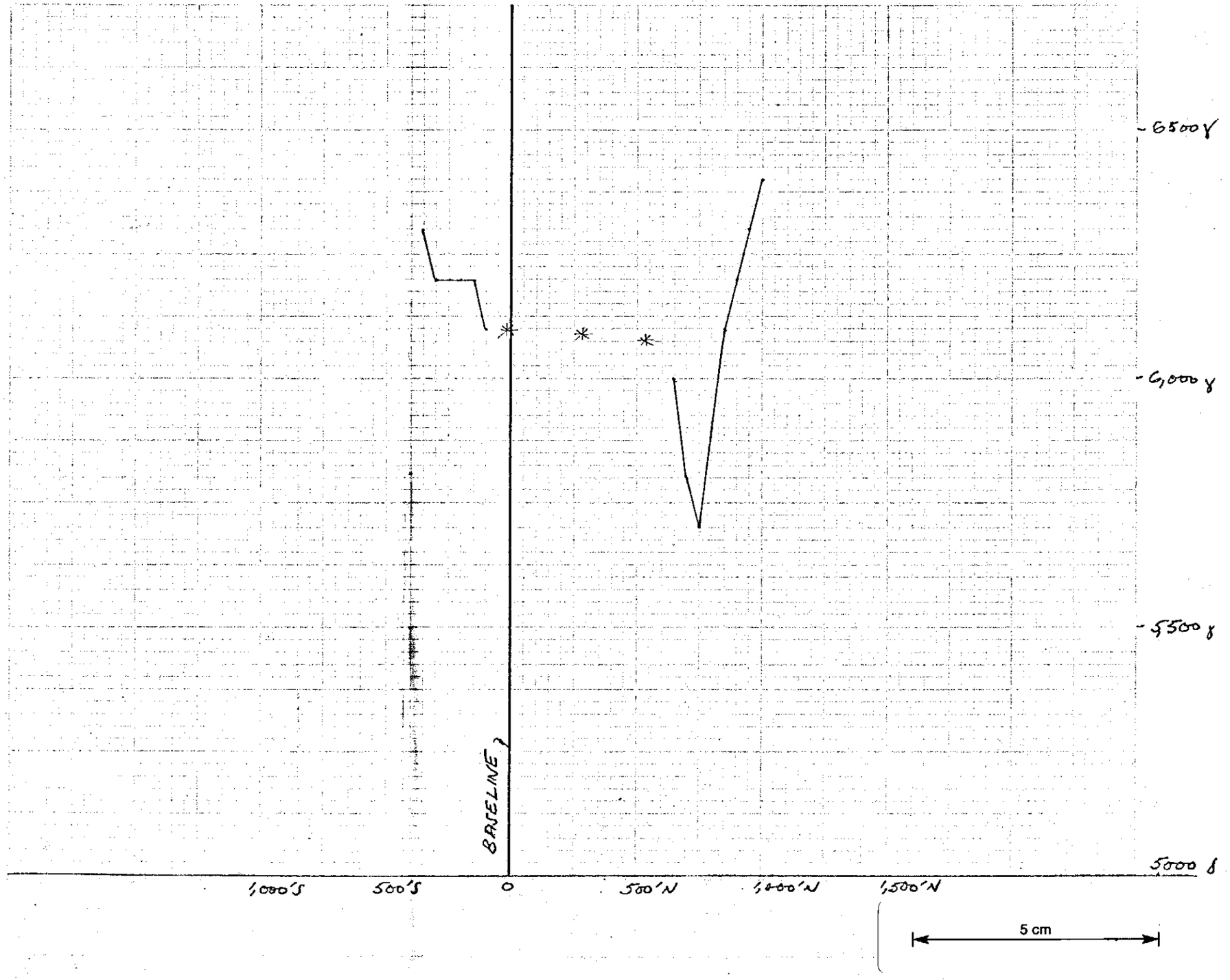
KEUNECKE, O., 1959 Magnetic survey of the Natone, Blythe River-Cuprona and Highclere Iron Ore Deposits, North Western Tasmania. B.M.R. Rec. 1959, No. 11.

* No reading (Shed, houses, power lines)

003

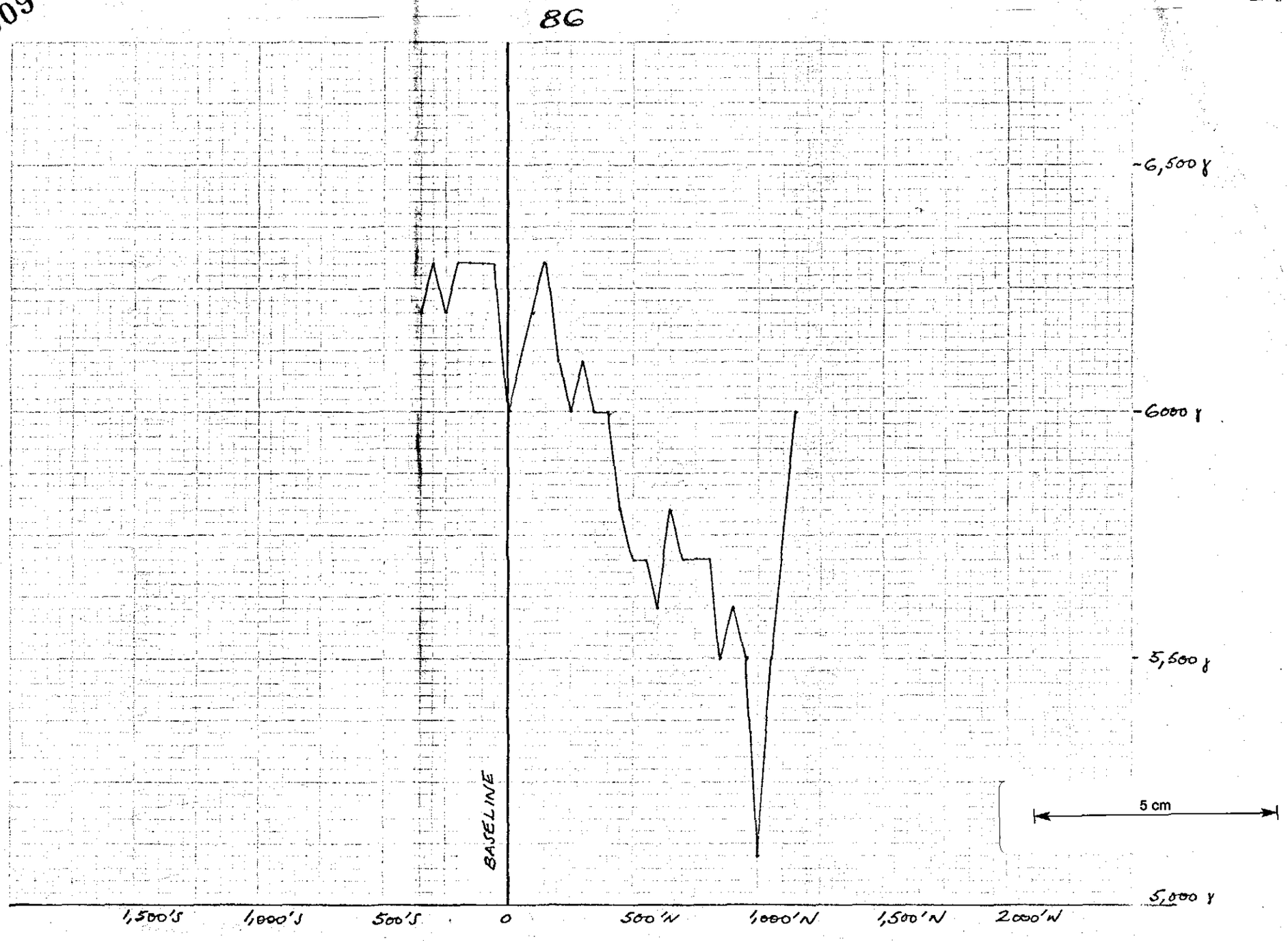
88

974009



70-665
009

974010



010 70-665

974011

BASELINE 00

7,000 ↓
6,300 ↓
6,200 ↓
6100 ↓
6000 ↓
5,500 ↓
5,400 ↓
5,300 ↓
5200 ↓
5100 ↓
5,000 ↓

5 cm

1000'S 500'S 0 500'N 1000'N 1500'N

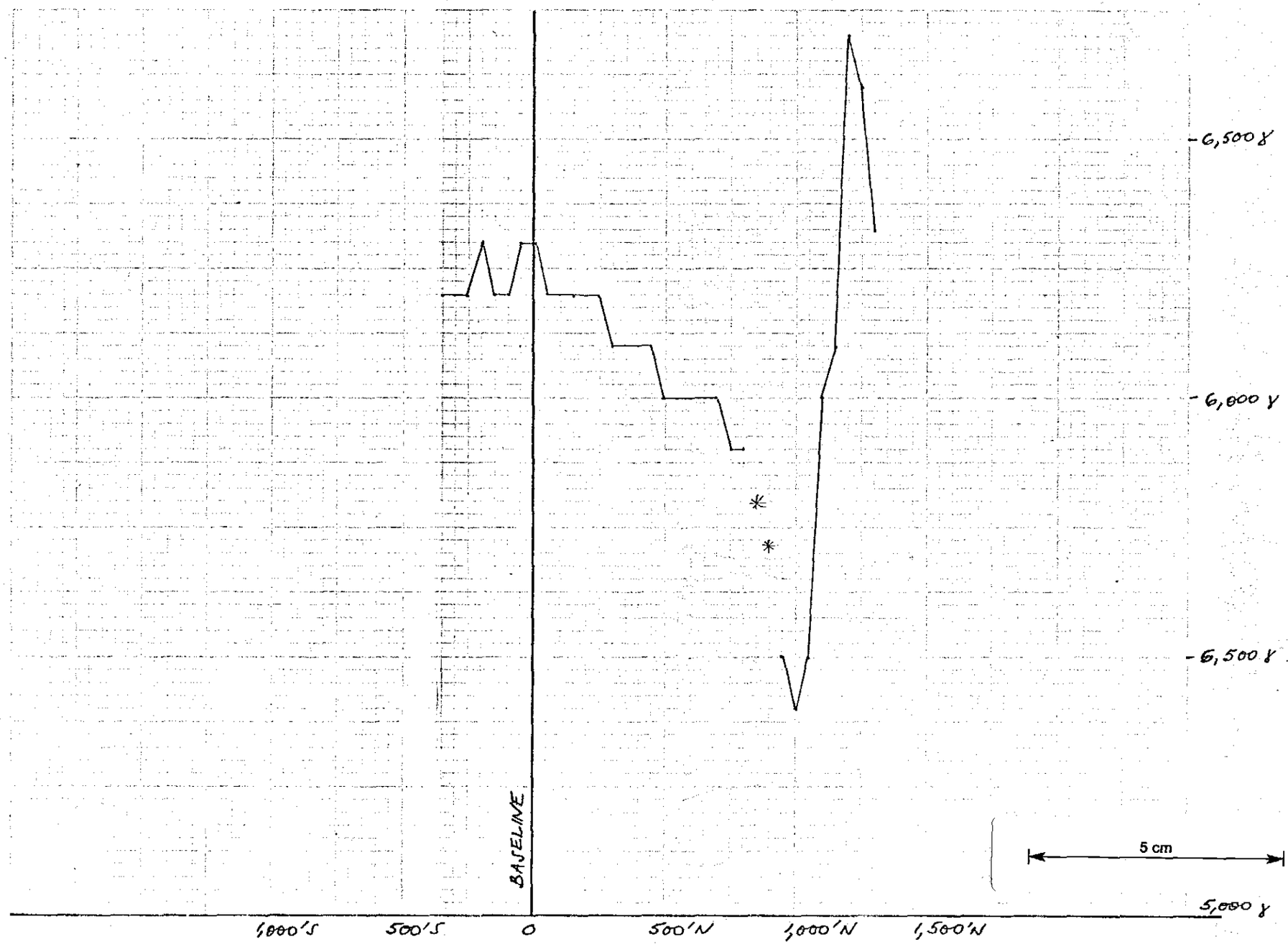
GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10chs. ½ & 1 inch

70-665 011

* No Reading (DAM)

974012

84



70-665

974013

012

82

-6
7,000γ

-6500γ

-6,000γ

-5500γ

5,000γ

BASELINE

1,000'S 500'S 0 500'N 1000'N 1,500'N 2,000'N

5 cm

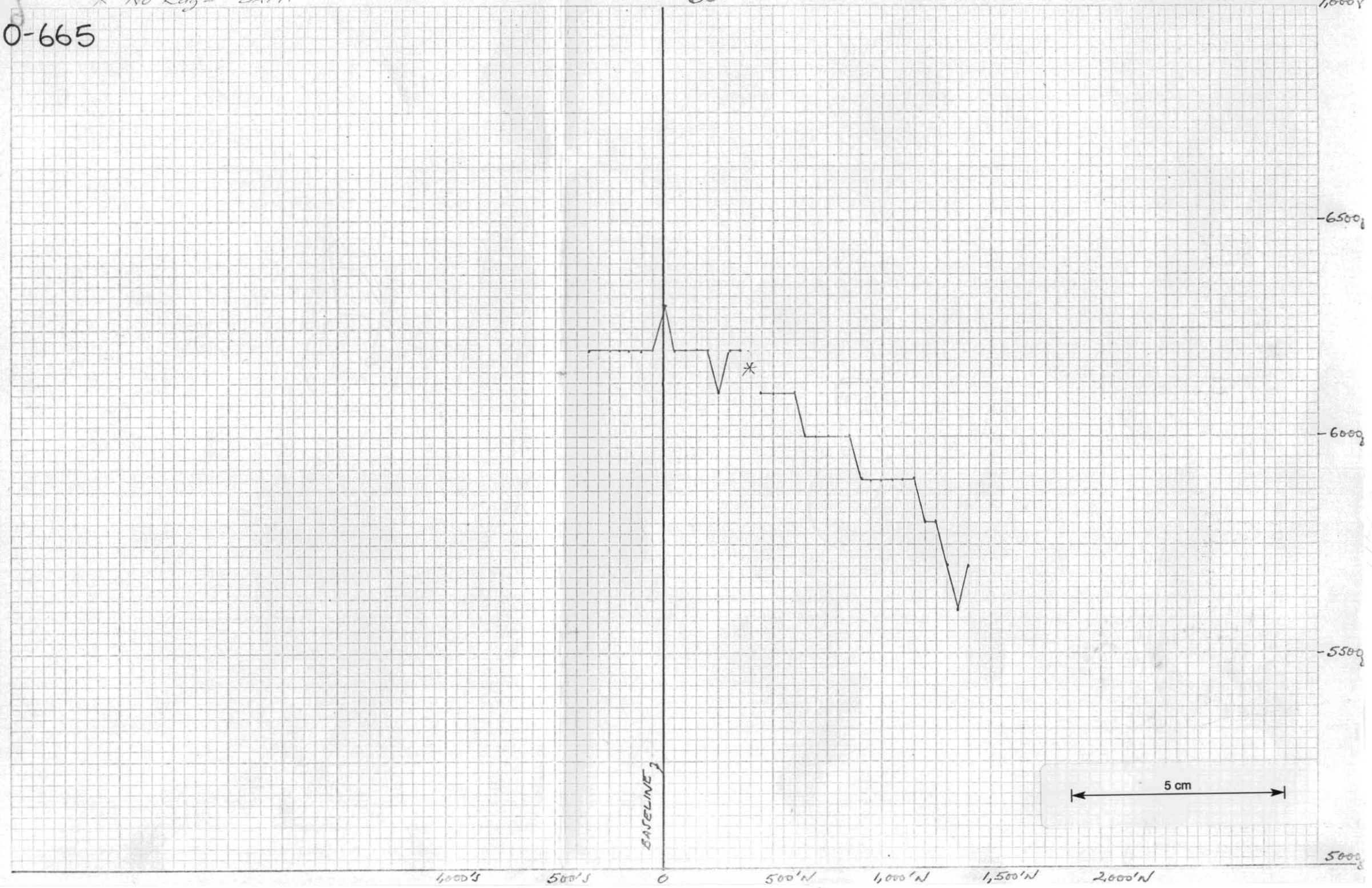
013

70-665

* No Rdg - DAM.

80

974014

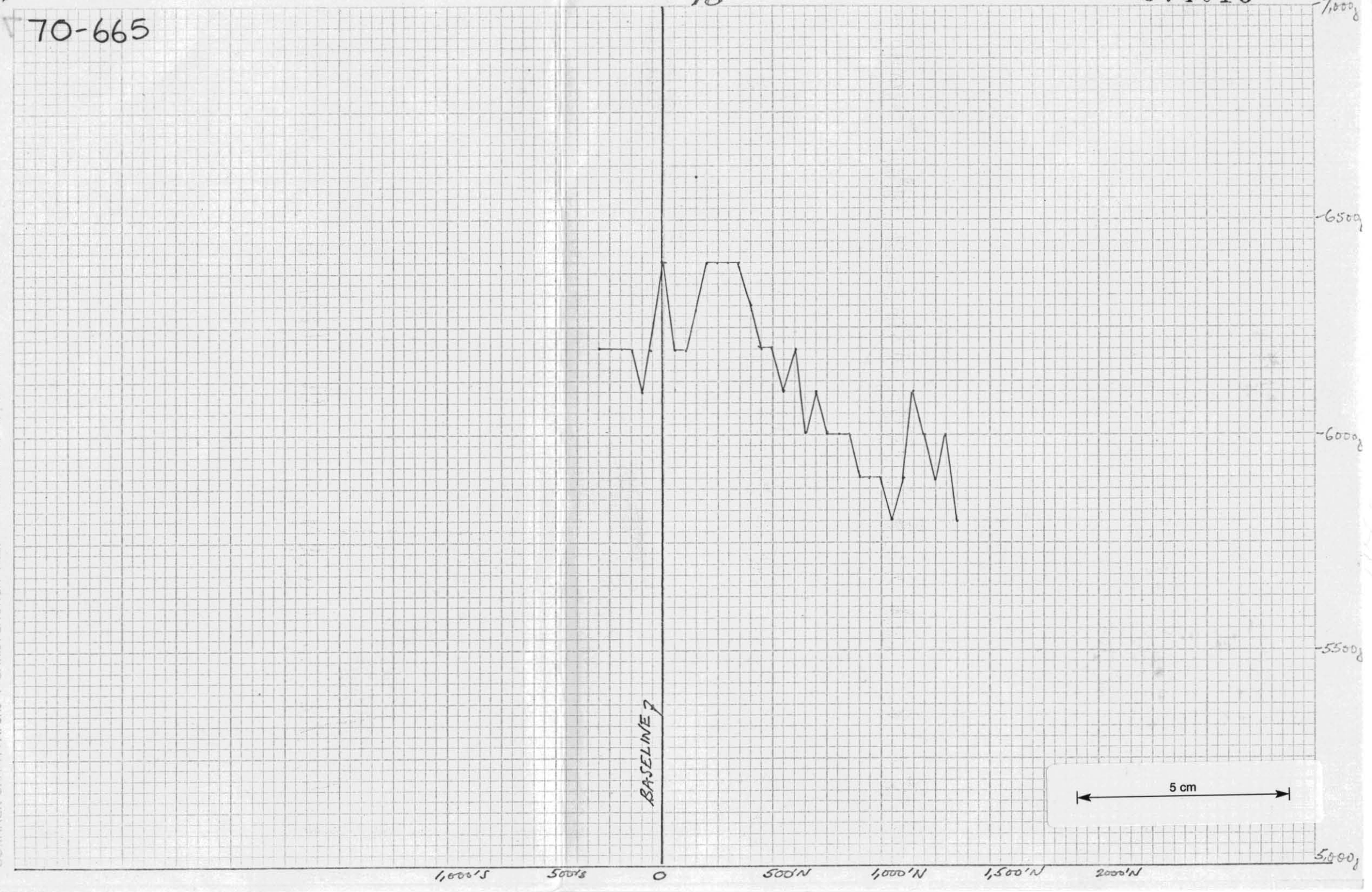


014

70-665

78

974015

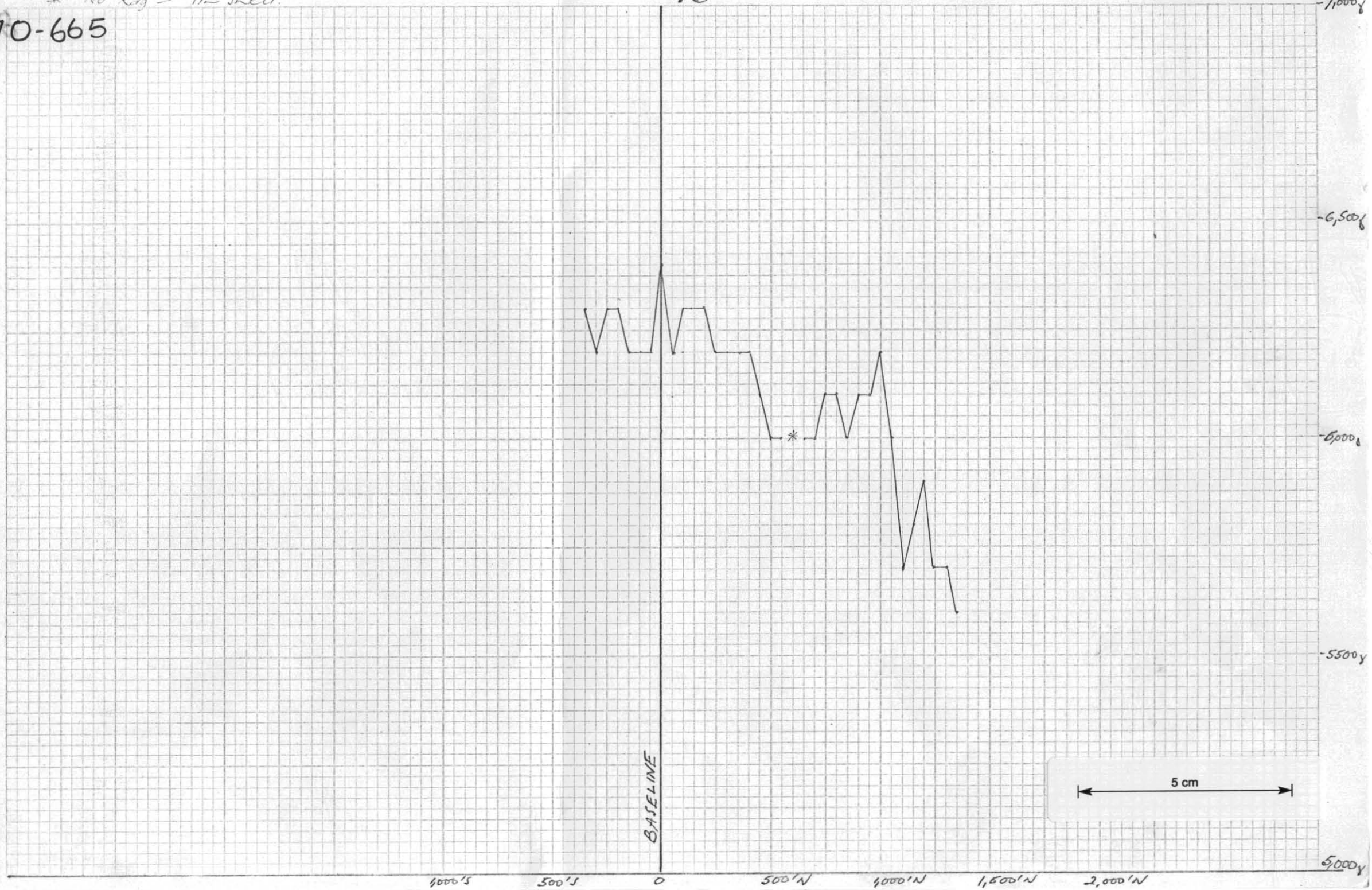


015 * No Rdg – Tin Shed.

70-665

76

974016



GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10ths, ½ & 1 inch

016 70-665

74

974017

7000γ

6500γ

6,000γ

-5,500γ

5,000γ

BASELINE 7

1,000'S 500'S 0 500'N 1,000'N 1,500'N 2,000'N 2,500'N

5 cm

70-665

017

974018

72

7,000γ

6500γ

6000γ

5500γ

5000γ

BASELINE

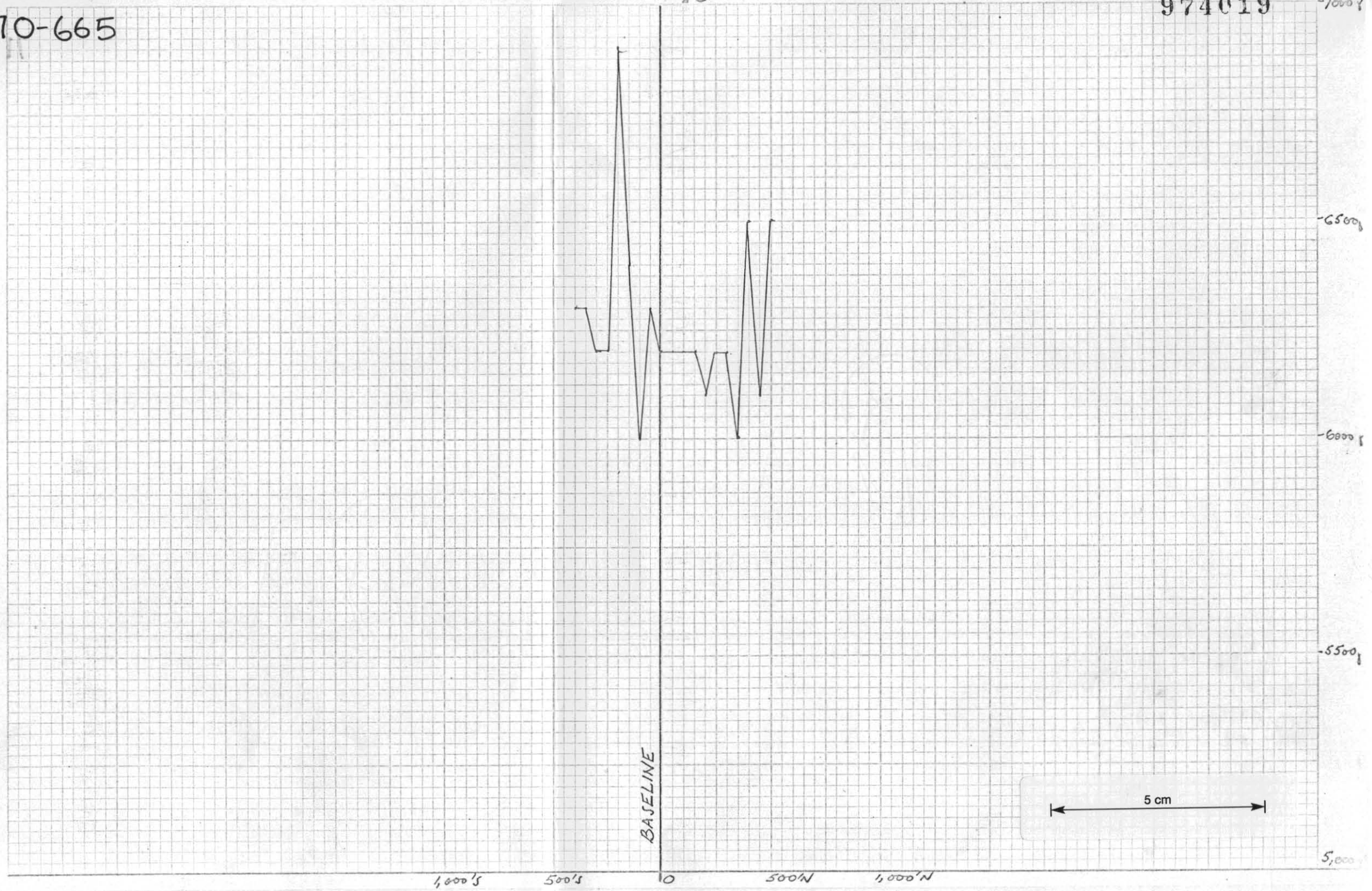
1,000'S 500'S 0 500'N 1,000'N 1,500'N

5 cm

GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10ths, 1 & 1 inch

013 70-665

974019

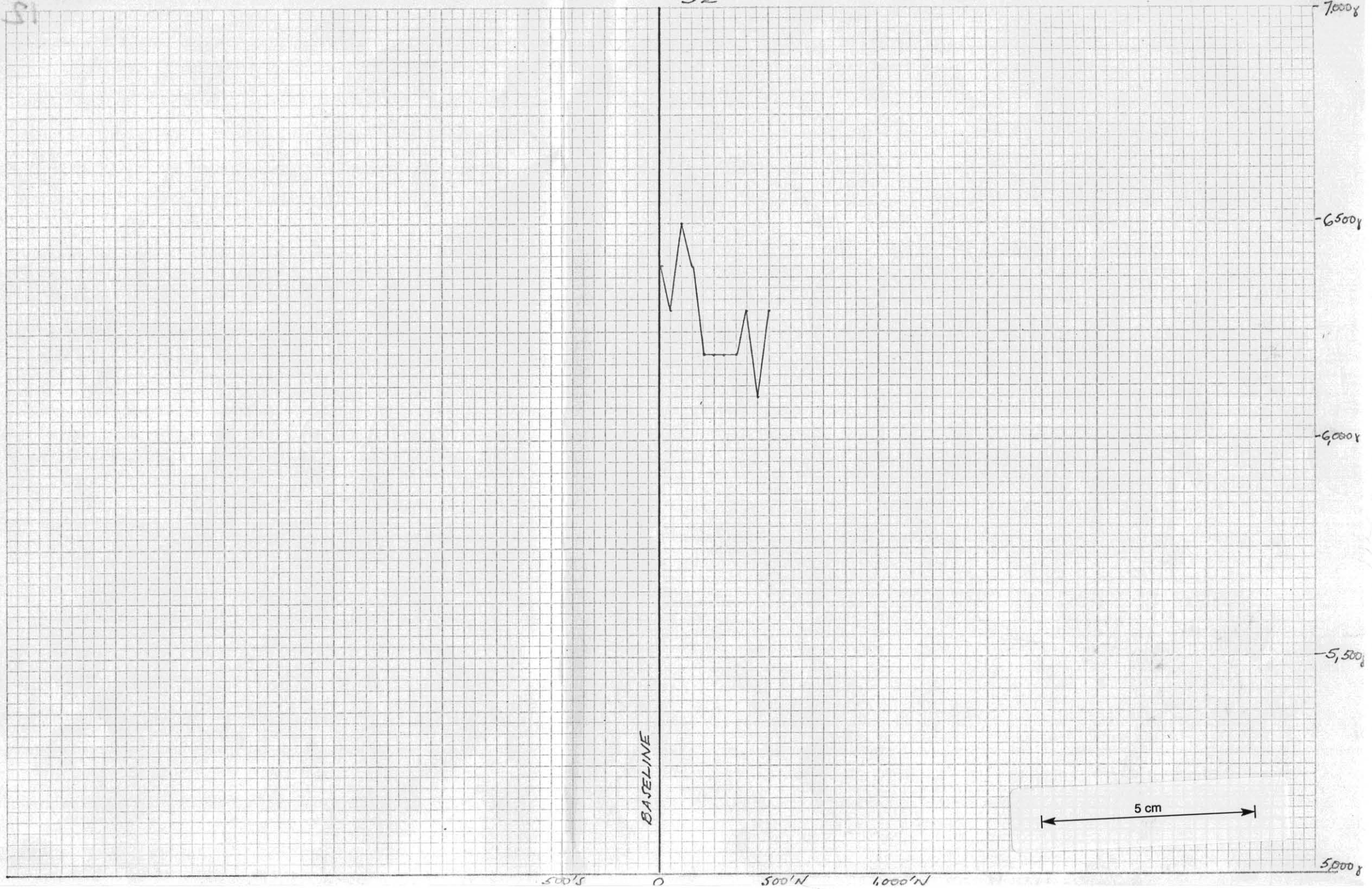


70-665

019

52

974020

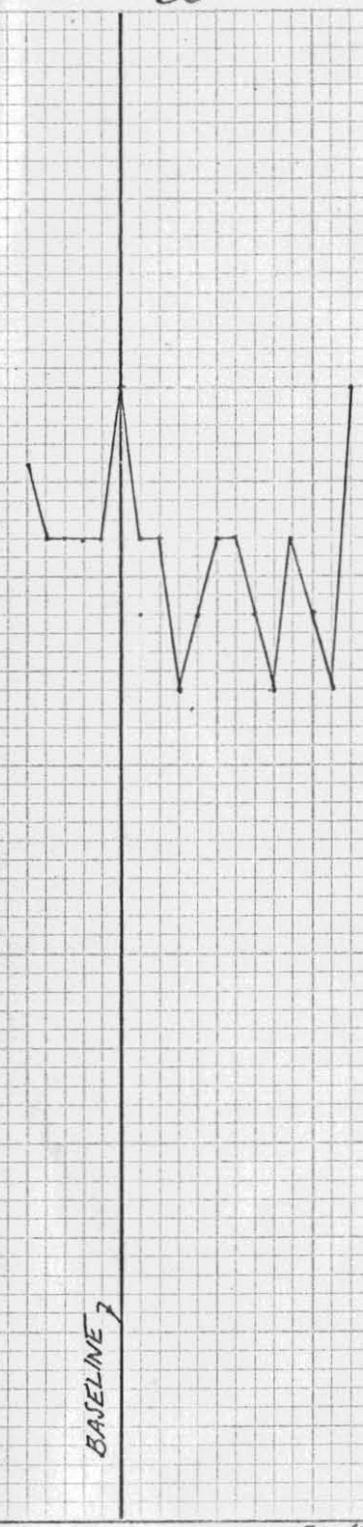


GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10chs. 1 & 1 inch

02070-665

974021

50



7000γ

6500γ

6000γ

5,500γ

5,000γ

BASELINE 7

1,500'S 1,000'S 500'S 500'N 1,000'N 1,500'N

5 cm

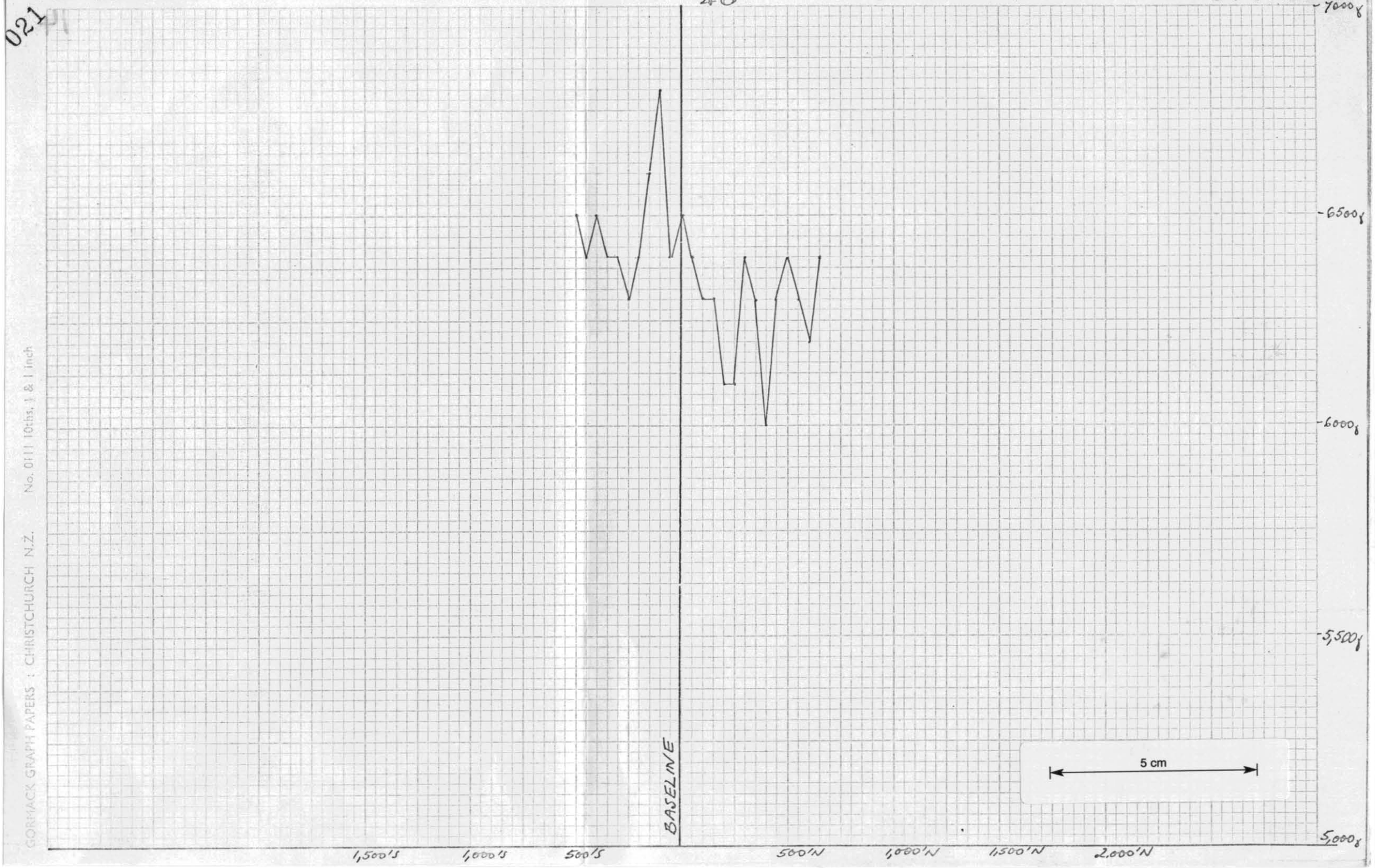
GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 011 10ths, 1 & 1 Inch

70-665

021

48

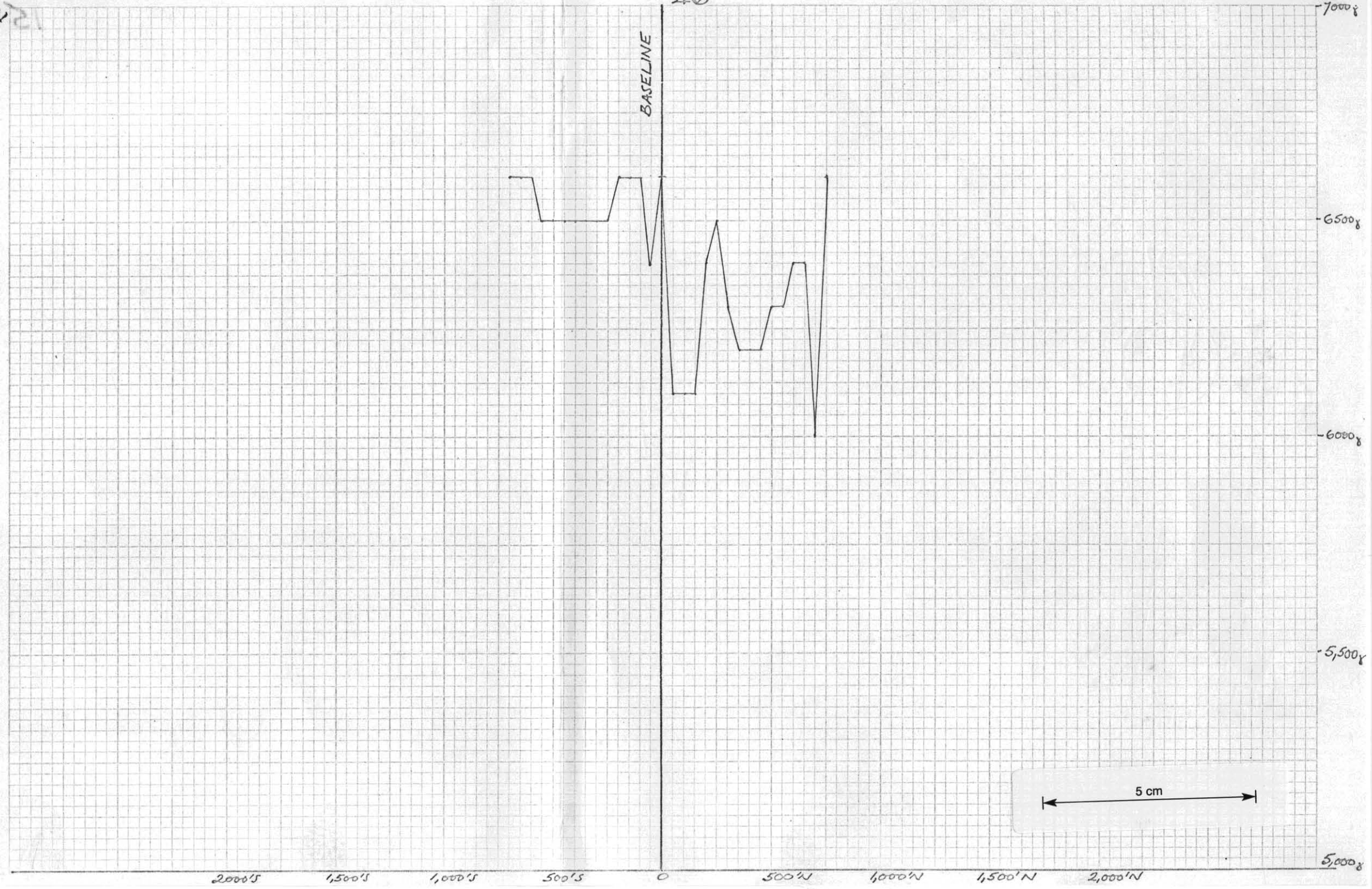
974022



70-665

022

974023



023

* No reading — House

70-665

44

974024

BASELINE

7,000γ

6,500γ

6000γ

5500γ

5,000γ

5 cm

1,500'S 1,000'S 500'S 0 500'N 1,000'N 1,500'N 2,000'N

70-665

024 F1

974025

70-665

02582

974026

40

7100

7000 γ

6500

6000

5,500

5000

5 cm

1,500'S 1,000'S 500'S 0 500'N 1,000'N 1,500'N 2,000'N

GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10ths, ½ & 1 inch

026

* No Reading - Dairy.

70-665

38

974027

BASELINE

8000 Y

7500

7000

6500

2000'S 1500'S 1000'S 500'S 0 500N 1000'N 1,500'N

5 cm

70-665

0225

36

974028

BASELINE

8400
8600
8400
8200

8000
7,500
7,000
6,500
6000

1500'S
1000'S
500'S
0
500'N
1,000'N
1,500'N

5 cm

No. 0111 10chs. 1 & 1 inch

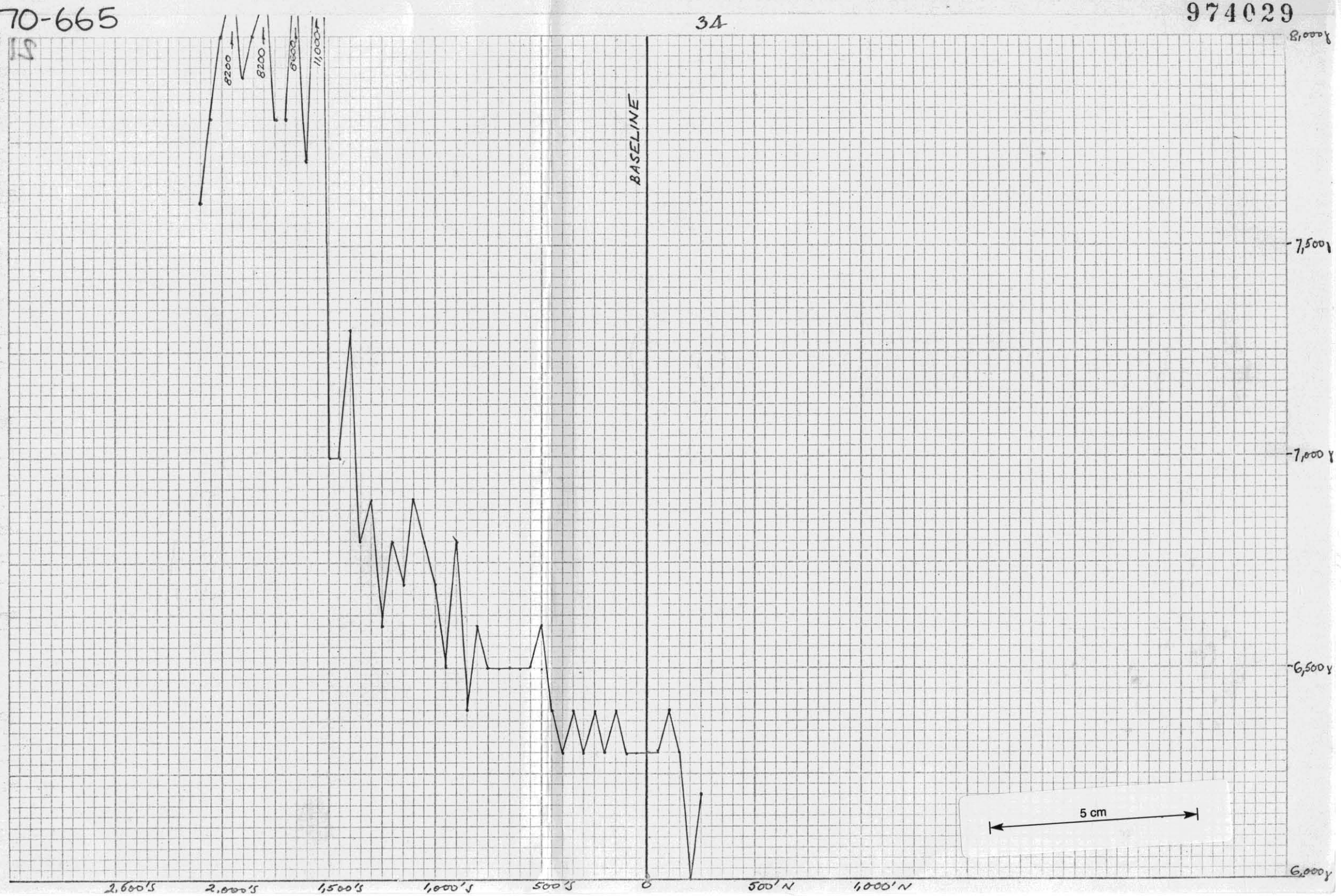
GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z.

70-665

028

34

974029



023

70-665

32

974030

7,000 Y

6,500 Y

6000 Y

5,500 Y

5,000 Y

5 cm

3,000'S 2,500'S 2,000'S 1,500'S 1000'S 500'S 0 500'N 1,000'N 1,500'N 2,000'N

70-665

974031

30

BASELINE

7200
7300
7200
7200

7000 γ

6500 γ

6000 γ

5500 γ

5000 γ

5 cm

2 500'S 2000'S 1.500'S 1000'S 500'S 0 500'N 1.000'N 1.500'N 2 000'N

GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10chs. 1 & 1 inch

031

70-665

28

974032

BASELINE

7,600
7,500
7,300
7,100

7000 Y
6500 Y
6000 Y
5,500 Y
5000 Y

2,000'S 1,500'S 1,000'S 500'S 0 500'N 1,000'N 1,5000'N 2,000'N

5 cm

03270-665

26

974033

BASELINE

7,000$

6500$

6000$

5,500$

5000$

2,500'S 2,000'S 1,500'S 1,000'S 500'S 0 500'N 1,000'N 1,500'N 2'000 N

5 cm

033 70-665

24

974034

BASELINE

7,00

6,500

6,000

5,500

5,000

5 cm

2,500'S 2,000'S 1,500'S 1,000'S 500'S 0 500'N 1,000'N 1,500'N 2'000'N 2,500'N

70-665

974035

034

22

BASELINE

7,000 S

6,500 S

6000 S

5,500 S

5,000 S

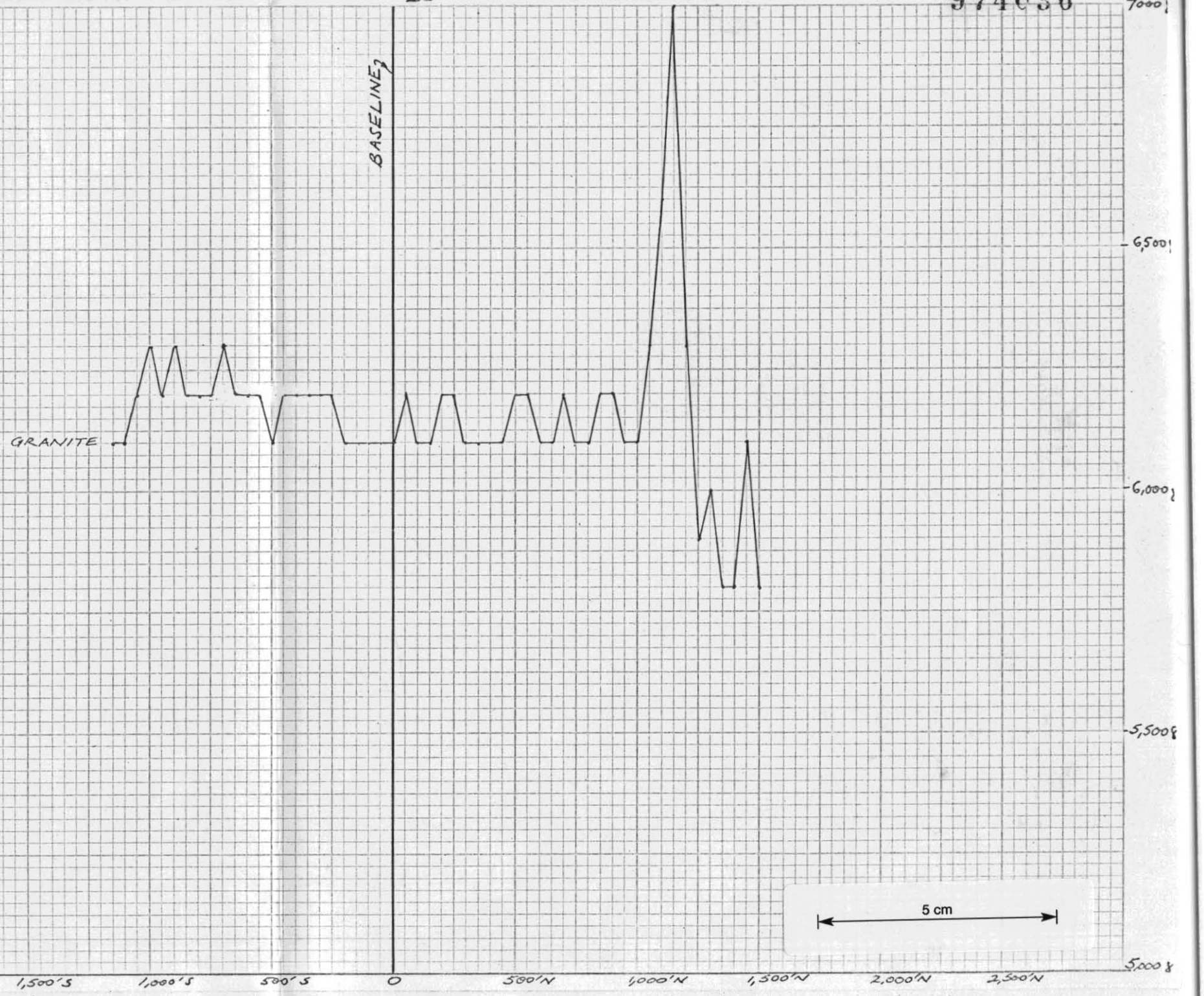
5 cm

2,000'S 1,500'S 1,000'S 500'S 0 500'N 1,000'N 1,500'N 2,000'N

70-665

035

974036



70-665

974037

036

18

BASELINE 7

GRANITE

7,000'

6,500'

6,000'

5,500'

5,000'

1000'S

500'S

0

500'N

1000'N

1500'N

5 cm

GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10ths, ½ & 1 inch

70-665

037

974038

BASELINE

GRANITE

-7000$

-6,500$

-6,000$

-5,500$

-5,000$

1,500'S 1,000'S 500'S 0 500'N 1,000'N 1,500'N 2,000'N

5 cm

70-665

974039

U38

14

BASELINE

GRANITE

7,000 N

6,500 N

6,000 N

5,500 N

5,000 N

5 cm

1,500'S 1,000'S 500'S 0 500'N 1,000'N 1,500'N 2,000'N

70-665

033

974040

12

BASELINE

7,000 γ

6,500 γ

6,000 γ

5,500 γ

5,000

5 cm

GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10ths, ½ & 1 inch

70-665

974041

0410

10

BASELINE

7000 γ

6500 γ

6000 γ

5500 γ

5000 γ

-4,100 γ

5 cm

1000'S

500'S

500'N

1000'N

1500'N

GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10ths, ½ & 1 inch

70-665

041

974042

8

BASELINE

7,000N

6,500N

6000N

5,500N

5,000N

5 cm

1000'S 500'S 0 500'N 1000'N 1500'N

70-665

974043

042

6

BASELINE

7,000γ

6,500γ

6,000γ

5,500γ

5,000γ

5 cm

GORMACK GRAPH PAPERS : CHRISTCHURCH N.Z. No. 0111 10ths, ½ & 1 inch

70-665

974044

4

BASELINE

7,000 γ

6500 γ

6,000 γ

5,500 γ

5,000 γ

1000'S

500'S

0

500'N

1000'N

1500'N

5 cm

70-665

044

LINE 2

BASELINE

7,000

6,500

6,000

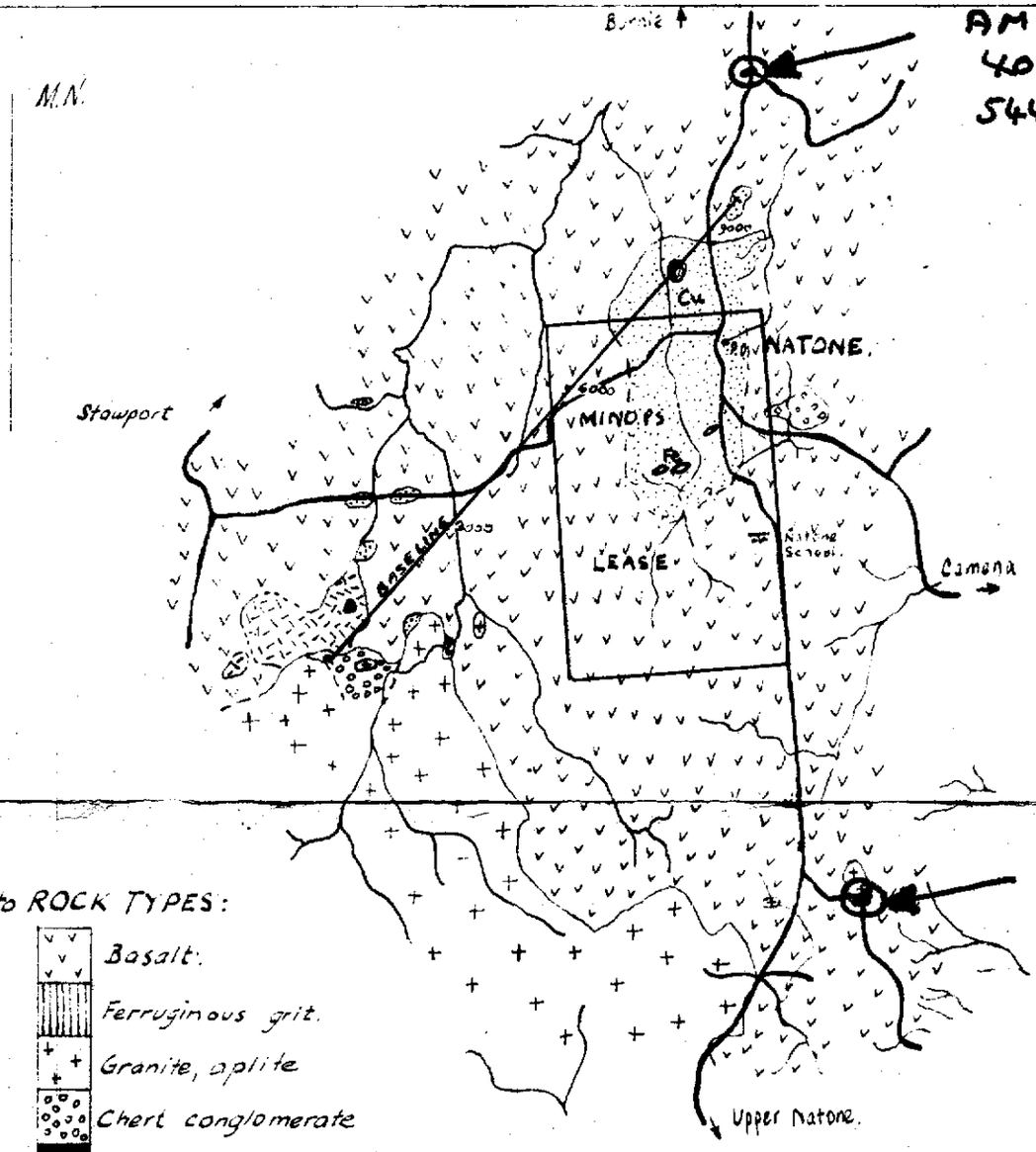
5,500

5,000

1000'S 500'S 0 500'N 1000'N 1,500'N 2000'N

5 cm

048



KEY to ROCK TYPES:

Tertiary		Basalt.
Tertiary (?)		Ferruginous grit.
Devonian		Granite, aplite
Ordovician		Chert conglomerate
Age not known		Pyroxene (lamprophyre?) rock.
Precambrian ?		Grey hornfels & chert.
Precambrian		Contorted siltstone, quartzite.

70-665

5 cm

AMG REFERENCE POINTS ADDED

1 ½ 0 1 2 3

Miles.

TASMINEX NO LIABILITY

Natone Prospect, Tasmania.

GEOLOGICAL MAP

Hall, Ralph and Associates Pty. Ltd.,

Sydney.

J.H. 4-8-70.

MN

Rutherfords Copper Prospect

Area to be sampled on a 100' x 50' grid (ie further sampling at 50' intervals along lines 75, 76, 77 & 79.)

Bose Line

Line 28 to be resampled

Lines 0 to 8 to be resampled & extended to YN

Area to be sampled on 100' x 100' grid.

Area to be sampled on a 100' x 200' grid. (ie. further sampling every 100' along lines -4, -2, 2, 6, 10, & 14).

LEGEND

- — — End of geochemical sampling
- . < 70 ppm Cu.
- x 70-100 ppm Cu.
- o 100-200 ppm Cu (exact values are indicated next to points of sampling)
- * > 200 ppm Cu - " - " "
- Magnetic anomoly (contour interval 500 gammas)
- AN Grid coordinate

5 cm

974047 70-665

TASMINEX N. L.

NATONE PROSPECT, N.W. TASMANIA

PLAN OF GRID SHOWING

ANOMOLOUS GEOCHEMICAL/MAGNETOMETER RESULTS

0 250 500 750 1000 FEET

HALL, RELPH & ASSOCIATES PTY. LTD.

1737

045

974048

Telegrams and Cables:
"Visor", Sydney

Telephones: 21x1508
21x1508
21x2268

241 1105

CARGO SUPERINTENDENTS
CO. (A/SIA.) PTY. LTD.

Scottish House,
19 BRIDGE ST.,
SYDNEY, 2000

Certification

K70-780

This is to Certify that we did analyse the undermentioned:

APPLICANT: Hall Relph & Associates
36 Clarence Street,
SYDNEY. 2000

SUBJECT: FOUR HUNDKED (400) SOIL SAMPLES received in our Registered Laboratory on 26. 6. 1970 for the purpose of analysing.

ANALYSIS: Cu only by Atomic Absorption Spectroscopy on minus 80 mesh fraction. Limit of detection 2 ppm.

FINDINGS: Results of our determinations are as under:

SAMPLE NO.	Cu ppm	SAMPLE NO.	Cu ppm	SAMPLE NO.	Cu ppm	SAMPLE NO.	Cu ppm
0 - AN	5	4 - UN	85	12 - EN	130	16 - CN	30
Cn	5	WN	125	GN	150	EN	125
EN	5	AS	10	IN	95	GN	80
GN	105	CS	5	KN	120	IN	60
IN	90	ES	10	MN	60	KN	50
KN	70			ON	60	MN	45
MN	100	8 - AN	160	QN	95	ON	40
ON	125	CN	180	SN	195	QN	45
QN	100	EN	115	UN	80	SN	50
SN	65	GN	170	WN	125	UN	25
UN	65	IN	90	YN	85	WN	35
WN	85	KN	115			YN	190
AS	5	MN	90	12 - ANN	65	AS	30
CS	< 2	ON	20	CNN	65	CS	35
		QN	50	ENN	55	ES	45
4 - AN	10	SN	35	AS	80	GS	50
CN	30	UN	50	CS	85	IS	65
EN	60	WN	40	ES	70	KS	85
GN	55	AS	160	GS	70	MS	100
IN	50	CS	170	IS	65	OS	20
KN	95	ES	200	KS	75	ANN	50
MN	125	GS	60	MS	50	CNN	40
ON	75			OS	30	ENN	45
QN	55	12 - AN	150			GNN	85
SN	70	CN	115	16 - AN	50		

This Laboratory is Registered by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of registration.

For
CARGO SUPERINTENDENTS CO. (A/SIA.) PTY. LTD.

Chief Chemist.

A.R.A.C.I.

046

974049

CARGO SUPERINTENDENTS CO. (A/SIA.) PTY. LTD.

SHEET TWO ATTACHING TO AND FORMING PART OF CERTIFICATE K70-780

SAMPLE NO.	Cu ppm
16 - INN	80
KNN	70
20 - AN	50
CN	50
EN	55
GN	90
IN	45
KN	50
MN	150
ON	35
QN	60
SN	60
UN	65
WN	55
YN	40
ANN	40
CNN	80
ENN	90
AS	45
CS	40
ES	95
GS	50
IS	30
KS	45
MS	60
OS	110
QS	160
SS	75
US	40
WS	25
24 - AN	65
CN	70
EN	40
GN	50
IN	70
KN	70
MN	55
ON	50
QN	No sample
SN	60
UN	185
WN	115
AS	45
CS	50
ES	55
GS	40
IS	10
KS	10
28 - AN	100
CN	180
EN	70
GN	40
IN	120
KN	115
MN	135
ON	125
AS	110
CS	75
ES	110
GS	10

SAMPLE NO.	Cu ppm
28 - IS	20
KS	30
MS	95
OS	90
QS	70
SS	60
US	45
WS	65
YS	50
ASS	60
CSS	45
ESS	65
GSS	95
ISS	55
KSS	75
MSS	60
OSS	80
QSS	70
SSS	55
USS	55
32 - AN	20
CN	30
EN	30
GN	60
AS	10
CS	50
ES	60
GS	30
IS	20
KS	40
MS	45
OS	30
QS	45
SS	30
US	40
WS	65
YS	40
ASS	25
CSS	50
ESS	30
GSS	45
ISS	25
KSS	30
MSS	30
OSS	30
QSS	40
SSS	30
36 - AN	70
CN	55
EN	70
AS	55
CS	50
ES	50
GS	80
IS	65
KS	50
MS	50
OS	60
QS	65
SS	50

SAMPLE NO.	Cu ppm
36 - US	60
WS	75
YS	50
ASS	40
CSS	65
ESS	50
GSS	55
ISS	55
KSS	65
40 - AN	45
CN	60
EN	50
GN	45
IN	55
KN	40
MN	65
ON	70
QN	50
SN	45
UN	50
AS	40
CS	50
ES	55
GS	50
IS	50
KS	60
MS	65
OS	60
QS	70
SS	65
US	70
WS	85
YS	60
ASS	65
44 - AN	35
CN	45
EN	45
GN	No sample
IN	55
KN	50
MN	50
YN	40
48 - AN	40
EN	45
GN	35
IN	45
KN	50
MN	30
70 - AN	< 2
BN	3
CN	3
DN(1)	60
DN(2)	20
EN	45
FN	70
GN	50
IN	35
AS	35
BS	95

SAMPLE NO.	Cu ppm
70 - CS	30
ES	30
FS	35
GS	100
74 - 74	30
AN	20
BN	10
CN	15
DN	30
EN	25
FN	30
GN	60
IN	45
KN	40
MN	40
ON	50
QN	50
SN	40
UN	50
WN	50
YN	30
AS	10
BS	20
CS	10
DS	15
ES	20
FS	25
GS	60
78 - 78	30
AN	115
BN	0.23%
DN	30
EN	25
FN	5
GN	5
IN	2
KN	20
MN	20
ON	25
QN	35
SN	35
UN	50
WN	55
YN	55
AS	60
BS	30
CS	95
DS	15
ES	15
FS	< 2
82 - 82	15
AN	5
BN	25
CN	5
DN	5
EN	5
FN	5
GN	10
IN	25
KN	15

28

04.

CARGO SUPERINTENDENTS CO. (A/SIA.) PTY. LTD.

974050

SHEET THREE ATTACHING TO AND FORMING PART OF CERTIFICATE K70-780

SAMPLE NO.	Cu ppm
82 - MN	15
ON	5
QN	20
SN	20
UN	35
WN	35
YN	30
AS	5
BS	15
CS	5
DS	10
ES	55
FS	60
GS	5
86 - 86	75
AN	5
BN	20
CN	90
DN	60
EN	15
FN	5
GN	30
IN	20
KN	120
MN	80
ON	50
QN	40
SN	50
UN	60
AS	5
BS	10
CS	10
DS	5

SAMPLE NO.	Cu ppm
86 - ES	25
FS	10
GS	15
90 - 90	30
AN	30
BN	10
CN	15
DN	20
EN	60
FN	55
GN	30
IN	20
KN	45
MN	50
AS	20
BS	10
CS	10
DS	15
ES	15
FS	3
GS	5
94 - 94	55
AN	25
BN	20
CN	30
DN	30
EN	35
FN	40
GN	50
AS	50
BS	30
CS	25
DS	65

SYDNEY
9th July 1970

Not accessible

Dump. Pyritiferous quartz

+ Peg 78, DN

Flows into Chasm Creek

Dump. Pyritiferous quartz, some malachite

Dump Fresh slate and bluish fault pug

"BLUE LODE"

Shaft & tunnel water filled

Barren quartz vein

Costean

SURVEY

Haematite gossan float

Peg × 7700

BASELINE GEOCHEMICAL & MAGNETOMETER

Dump pyritic quartz contorted slate

Inaccessible

Weathered slate & quartzite No defined lode

Peg 76, 85

Soil only Some yellow gossan on slides

In weathered, contorted & brecciated slate.

Some quartzite

45°

Earthy gossan- no voids

CREEK

MAG. NORTH

Peg 74, 65

Dump. Pyritiferous quartz; some chalcopyrite

Dump. Dark grey hornfels & slate

Dump. Slate

Inaccessible

45°

S

siltstone

Schistosity

Slate

To Natone & Stowport

ROADWAY

Stowport

974051

5 cm

70-665

LEGEND:

- Tunnel mouth
- Shaft
- Joint, with dip
- Shear, with dip

SCALE: 40 Feet to an Inch

0 20 40 60 80 100 200 feet

TASMINEX N/L

RUTHERFORD'S COPPER PROSPECT

NATONE, TASMANIA

1738

Compass & tape map of workings

HALL, RELPH & ASSOCIATES P/L,
Consulting Geologists,
Sydney.

J. H. 1-8-1970

T A S M I N E X N. L.

E.L. 1/69

NATONE COPPER/IRON PROSPECT, TASMANIA

70-665

HALL, RELPH & ASSOCIATES PTY. LTD.

6TH APRIL, 1971.

& GEOLOGICAL & EXPLORATION CONSULTANTS

I. R. HALL . M.Sc., M.A.A.P.G., M.Aus.I.M.M.
R. E. RELPH . B.Sc., M.Aus.I.M.M.

8th FLOOR
36-38 CLARENCE STREET,
SYDNEY, 2000, AUSTRALIA
TEL.: 29-5631

001

974053

6th April, 1971.

N A T O N E

INTRODUCTION

Reference is made to Hall, Relph & Associates report dated 18th February, 1971. Geochemical determinations for the samples collected from the percussion drill holes at the Natone copper prospect are to hand. Analysts reports are included in the appendix, together with information on the numbering system applicable to the results.

CONCLUSION

Of the four major geochemical soil anomalies drilled, only one appears to warrant further investigation. Percussion hole numbers 15, 13 and 12 located in the vicinity of the soil anomaly centred at 2KN show numerous copper values of over 600ppm. These values were obtained from the soil cover, as the water table prevented drilling below 30 feet. The soil cover in this area contains a considerable percentage of fine white mica (illite) which may be derived from hydrothermally altered bedrock.

Other percussion holes show isolated high copper values in the soil of up to 675ppm but there appears to be no trend in the distribution of higher values and no apparent increase in copper values at depth.

RECOMMENDATIONS

It is recommended that a limited exploratory diamond drilling programme be carried out in the area of the geochemical soil anomaly centred at 2KN. The aims of the investigation are:-

1. To detect any hydrothermal alteration in the bedrock which may be associated with the emplacement of an ore body.

2. To delineate any trend in the distribution of copper values at depth.

002

974054

Suggested diamond drilling programme

Hole No	Co-ordinates	Bearing	Declination	Depth
1	1.5IN	290°	60°	150'
2	1.5MN	100°	60°	150'

Geophysical Induced Potential method of investigation is considered to be of little interpretative value in this area in view of the widespread distribution of disseminated pyrite.

COST ESTIMATES

Diamond drilling operations	$3,000
Geological supervision, core logging report compilation etc.	500
Assay costs	200
Accommodation, fares etc.	200
Total	$3,900

HALL, RELPH & ASSOCIATES PTY. LTD.

B K Wood D. Sc.

JP:pa

003

APPENDIX 1

974055

PERCUSSION DRILLING PROGRAMME
NATONE

SAMPLE NO.	HOLE NO.	DEPTH in feet
A151	15	0'- 5'
A152	15	5'-10'
A153	15	10'-15'
A154	15	15'-20'
A155	14	0'- 5'
A156	14	5'-10'
A157	14	10'-15'
A158	14	15'-20'
A159	14	20'-25'
A160	14	25'-28'
A161	13	0'- 5'
A162	13	5'-10'
A163	13	10'-15'
A164	13	15'-20'
A165	13	20'-25'
A166	13	25'-30'
A167	12	0'- 5'
A168	12	5'-10'
A169	12	10'-15'
A170	12	15'-20'
A171	12	20'-25'
A172	12	25'-30'
A173	1	0'- 5'
A174	1	5'-10'
A175	1	10'-15'
A176	1	15'-20'
A177	1	20'-25'
A178	1	25'-30'
A179	1	30'-35'
A180	1	35'-40'
A181	1	40'-45'
A182	1	45'-50'
A183	1	50'-55'
A184	1	55'-60'
A185	3	0'- 5'
A186	3	5'-10'
A187	3	10'-15'
A188	3	15'-20'
A189	3	20'-25'

A190	3	25'-30'
A191	3	30'-35'
A192	3	35'-40'
A193	3	40'-45'
A194	3	45'-50'
A195	3	50'-55'
A196	3	55'-60'
A197	3	60'-65'
A198	3	65'-70'
A199	3	70'-75'
A200	3	75'-77'
1705	4	0'- 5'
1706	4	5'-10'
1707	4	10'-15'
1708	4	15'-20'
1709	4	20'-25'
1710	4	25'-30'
1711	4	30'-35'
1712	4	35'-40'
1713	4	40'-45'
1714	4	45'-50'
1715	4	55'-60'
1716	4	60'-65'
1717	4	65'-70'
1718	4	70'-75'
1719	4	75'-80'
1720	7	0'- 5'
1721	7	5'-10'
1722	7	10'-15'
1723	7	15'-20'
1724	7	20'-25'
1725	7	25'-30'
1726	7	30'-35'
1727	5	0'- 5'
1728	5	5'-10'
1729	6	0'- 5'
1730	6	5'-10'
1731	6	10'-15'
1732	6	15'-17'
1733	2	0'- 5'
1734	2	5'-10'
1735	2	10'-15'
1736	2	15'-20'
1737	2	20'-25'
1738	2	25'-30'
1739	2	30'-35'
1740	2	35'-40'

1741	2	40'-45'
1742	2	45'-50'
1743	2	50'-55'
1744	2	55'-60'
1745	2	60'-65'
1746	8	0'- 5'
1747	8	5'-10'
1748	8	10'-15'
1749	8	15'-20'
1750	8	20'-25'
1751	8	25'-30'
1752	8	30'-35'
1753	9	0'- 5'
1754	9	5'-10'
1755	9	10'-15'
1756	9	15'-20'
1757	9	20'-25'
1758	9	25'-30'
1759	9	30'-35'
1760	10	0'- 5'
1761	10	5'-10'
1762	10	10'-15'
1763	10	15'-20'
1764	10	20'-25'
1765	10	25'-30'
1766	11	0'- 5'
1767	11	5'-10'
1768	11	10'-15'
1769	11	15'-20'
1770	11	20'-25'
1771	11	25'-30'
1772	11	30'-35'
1773	4	50'-55'

U06

Telegrams and Cables:
"Visor", Sydney

Telephone: 241 1105

CARGO SUPERINTENDENTS CO. (A/SIA.) PTY. LTD.

Scottish House
19 BRIDGE ST.,
SYDNEY, 2000

Certification

K71-155

This is to Certify that we did analyse the undermentioned:

APPLICANT: Hall Relph & Associates Pty. Ltd.,
36-38 Clarence Street,
SYDNEY. 2000
(Attention: Mr.G.Holland)

SUBJECT: One Hundred and Twenty (120) Soil Samples received in our Registered Laboratory on 5.2.1971 for the purpose of analysing.

ANALYSIS: Tested by Atomic Absorption Spectrophotometry

FINDINGS: Results of our determinations are as under:

SAMPLE NO	Cu	SAMPLE NO	Cu	SAMPLE NO	Cu	SAMPLE NO	Cu	SAMPLE NO	Cu
A 151	625	A 181	160	1715	150	1745	115	2 X UNMARKED	
152	725	182	155	1716	145	1746	235	SAMPLES	
153	205	183	115	1717	110	1747	240	A	110
154	230	184	120	1718	140	1748	370	B	80
155	155	185	160	1719	130	1749	250		
156	65	186	170	1720	250	1750	315	Limit of Detection	
157	100	187	190	1721	275	1751	405	= 5 ppm	
158	Missing	188	255	1722	650	1752	380		
159	80	189	215	1723	90	1753	110		
160	130	190	175	1724	240	1754	90		
161	190	191	190	1725	200	1755	85		
162	275	192	170	1726	310	1756	65		
163	550	193	195	1727	100	1757	60		
164	675	194	210	1728	95	1758	70		
165	600	195	195	1729	310	1759	75		
166	80	196	145	1730	220	1760	295		
167	525	197	125	1731	255	1761	190		
168	650	198	180	1732	220	1762	150		
169	220	199	155	1733	200	1763	100		
170	Missing	200	130	1734	240	1764	130		
171	80	1705	155	1735	295	1765	110		
172	75	1706	675	1736	350	1766	190		
173	190	1707	240	1737	365	1767	125		
174	600	1708	270	1738	300	1768	75		
175	240	1709	275	1739	190	1769	60		
176	250	1710	255	1740	130	1770	80		
177	270	1711	165	1741	175	1771	80		
178	155	1712	155	1742	160	1772	80		
179	170	1713	165	1743	130	1773	230		
180	165	1714	145	1744	110	[illegible]	[illegible]		

RECEIVED
22FEB1971
Ans'd.....

SYDNEY
19th February ,1971. Tasminex-Natone

This Laboratory is Registered by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of registration.

M.Bradley
Chief Chemist.
A.R.A.C.I.

For
CARGO SUPERINTENDENTS CO. (A/SIA.) PTY. LTD.

D.Holmes

Tasminex Natone

007

974059

GEOMIN LABORATORIES

SYDNEY — DARWIN — KALGOORLIE — PERTH

REPORT and SHEET No.

12984/1.

Analyst		E.T.								
Sample No.		Cu								
A 151		450								
52		500								
53		240								
54		290								
61		240								
62		SNR								
63		380								
64		470								
65		420								
66		88								
INTERNAL STANDARD		330								
67		370								
68		450								
69		240								
71		86								
A 172		82								

All results in parts per million unless otherwise stated.

-- not requested T/F to follow X below limit of detection S/P sent previously I.S. insufficient sample SNR sample not received .

These results are authentic only when accompanied by cover sheet signed by the registered NATA signatory.

Copies to members

T A S M I N E X N. L.

Natone Copper/Iron Prospect, Tasmania

B Y

HALL, RELPH & ASSOCIATES PTY. LTD.

21st December, 1970.

009

974061

CONTENTS PAGE

HALL, RELPH & ASSOCIATES PTY. LTD.
GEOLOGICAL & EXPLORATION CONSULTANTS

974062

9TH FLOOR
36-38 CLARENCE STREET,
SYDNEY, 2000, AUSTRALIA

TELEPHONE: 29-5631
CABLE: HALLRELPH, SYDNEY
TELEX: 21840

NATONE

Introduction

Within the south western portion of the Natone prospect a number of anomalous copper zones have been outlined by a soil geochemical programme. Field examination of the prospect shows each of the major anomalies to have similar petrological characteristics.

An anomalous copper zone outlined in the north eastern section of the geochemical survey area coincides with the mine dumps of Rutherfords copper prospect.

Geochemical Anomalies

The geochemical anomalies are depicted in contour form on the grid plan in the Appendix.

1.1 Anomaly "A" is centred at 10,DN where copper values of between 250ppm to 275ppm are obtained. Values greater than 200ppm extend over an area of approximately 40,000 square feet. This anomaly is one of the most concentrated and most extensive within the area enclosed by the geochemical survey. The anomaly is topographically located on a hill. Soil cover in the area is thin and intermittent outcrop reveals a series of hornfelsic rocks which range from the light grey quartz - rich variety to the darker cordierite/magnetite - rich variety. A lamprophyre dyke crops out in the northern part of the anomaly. Iron sulphide mineralisation occurs as fine disseminations aligned along veinlets at random disposition within the hornfelsec rocks.

1.2 Anomaly "B" is centred at 7,CS where copper values of between 225ppm to 250ppm occur. Values greater than 200ppm extend over an area of approximately 25,000 square feet. This anomalyis situated about 500 feet south of the centre of anomaly "A". The two anomalies are separated by an area of lower geochemical values (125ppm Cu to 175ppm Cu) associated with outcropping granite. The anomaly is of particular interest as it coincides with a north - south trending magnetic anomaly. Grey and black

hornfelsic rocks outcropping in the area contain small irregular veinlets of iron sulphide mineralisation.

1.3 Smaller anomalies are located west of anomaly "B" at 6BN (anomaly "C") and east of anomaly "B" at 9FS (anomaly "D"). Each contains copper values of between 200ppm to 250ppm over an area of about 10,000 square feet. Surface outcrop is poor in these areas.

1.4 Anomaly "E" is located at 4,ZNN and extends outside the area enclosed by the geochemical soil survey. Copper values of between 250ppm to 275ppm occur within the anomalous zone while values greater than 200ppm extend over an area of at least 40,000 square feet. The anomaly is located in an area of positive topographical relief where the soil cover is thin. Dark grey and black hornfelsic rocks outcrop in the area and contain occasional fine disseminations of iron sulphide mineralisation.

1.5 Anomaly "F" contains lower copper values than those encountered within the other anomalies of the area. The anomaly is centred at approximately 3KN and the distribution of anomalous copper values assumes a circular shape. Copper values ranging from 200ppm to 225ppm extend over an area of about 12,000 square feet. The soil cover is thin and the anomaly is topographically associated with an area of positive relief. Interbedded quartz rich and cordierite - rich hornfelsic rocks outcropping in the area contain fine disseminations of iron sulphide mineralisation.

Conclusions

i) All of the copper anomalies within the south - western section of the prospect, as outlined by the geochemical soil survey, are situated in areas of thin soil cover and are associated with outcropping hornfelsic rocks.

ii) The hornfelsic rocks contain fine veinlets and disseminations of iron sulphide mineralisation.

iii) The two largest and most concentrated anomalies i.e. "A" and "E" are topographically associated with hilltops. Lowlands situated between these anomalies are characterised by low copper values.

Recommendations

The mineral potential of the south western portion of the prospect as indicated by a geochemical soil survey suggests that

exploratory percussion drilling should be undertaken. The purpose of the drilling programme is three-fold.

1. To evaluate the significance of anomalous copper zones.
2. To delineate any trend in the localisation of sub-surface mineralisation.
3. To detect any hydrothermal alteration which may be associated with the emplacement of an ore body.

Suggested percussion drilling programme

Hole No.	Co-ordinates	Bearing	Declination	Depth
1	10DN		Vertical	60'
2	10EN	150°	60°	80'
3	11CN	270°	60°	80'
4	9CN	030°	60°	80'
5	6CS		Vertical	60'
6	7DS	270°	60°	80'
7	5BS	90°	60°	80'
8	4ANN		Vertical	60'
9	4BNN	150°	60°	80'
10	5ZN	270°	60°	80'
11	3ZN	30°	60°	80'
12	2KN		Vertical	60'
13	2LN	150°	60°	80'
14	3JN	270°	60°	80'
15	1JN	30°	60°	80'

No further investigation of Rutherfords copper prospect is warranted at this stage.

If the results obtained from the exploratory drilling programme prove to be encouraging then further exploration should include the extending of the geochemical soil sampling north of FNN and west of -4 with a view to delineating any other drilling targets.

Cost Estimates

Percussion drilling	$1,000
Geological supervision	$ 900
Assaying costs	$ 200
Fares, Accomodation etc	$ 200
Total	$2,300

HALL, RELPH & ASSOCIATES PTY. LTD.

B.L. Ward, D. Sc.

JP:pa

014

974066 Tasminex EL 1/69
Natone 1/69

October 23, 1970

MEMORANDUM TO : TASMINEX N.L.

SUBJECT : RESULTS OF GEOCHEMICAL AND MAGNETOMETER SURVEYS, NATONE PROSPECT

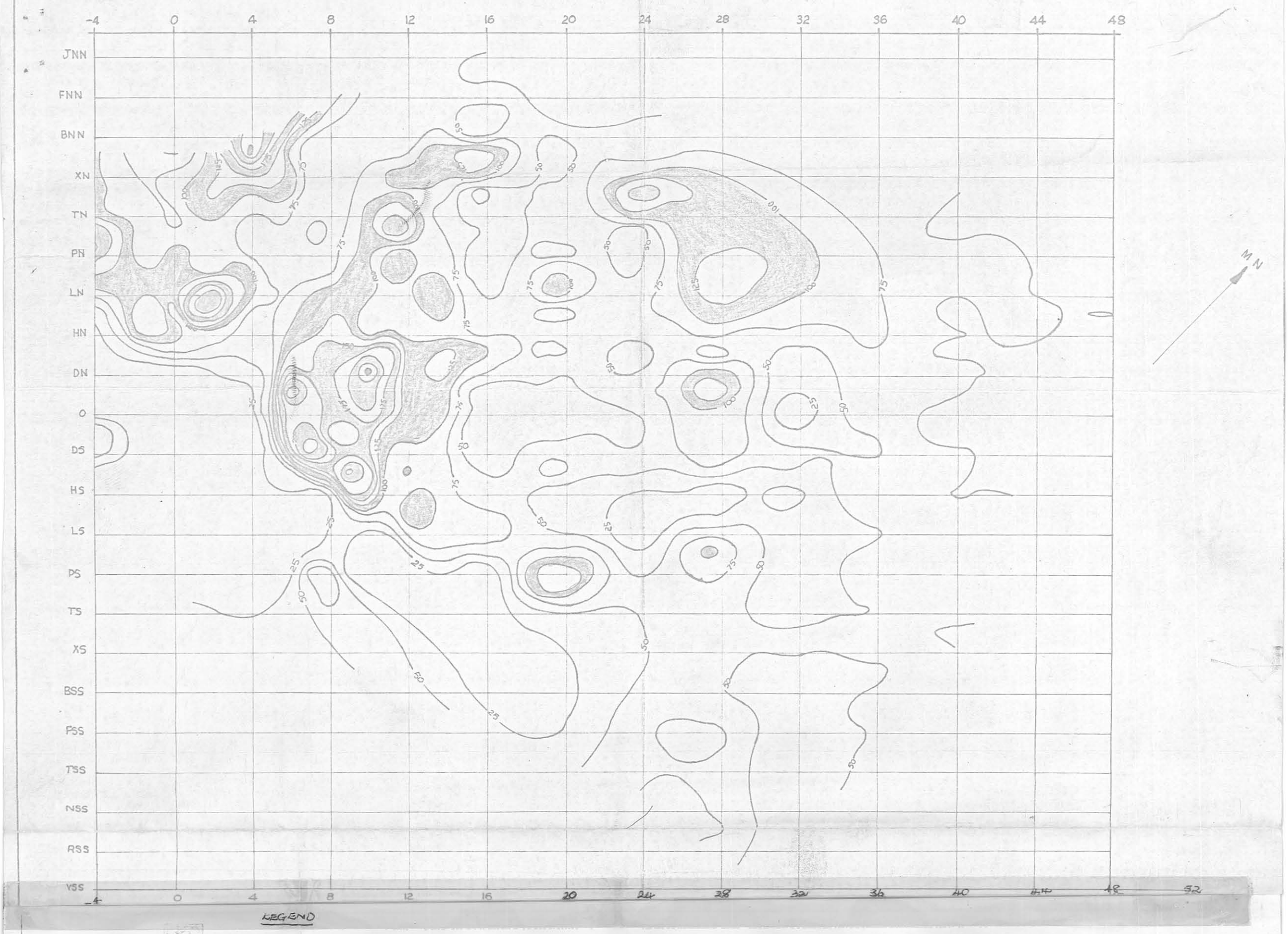
The computer-plotted results of the above surveys have now been made available by Data Analysis Pty. Ltd.

As pointed out in our earlier report, the analysis was instituted to delineate trend directions for induced polarisation survey. The analysis failed to indicate any definite trends which could be used with confidence in planning an induced polarisation survey, and our recommendation now extends to percussion drilling rather than IP survey.

Our Mr. Holland will be in Tasmania shortly, and will arrange a percussion drilling programme at that time. We will forward a copy of the results of the computer analysis as soon as they have been properly drafted.

HALL, RELPH & ASSOCIATES PTY. LTD.

JH/mt



LEGEND

100 - 125 p.p.m. Cu.

150 - 175 p.p.m. Cu.

200 - 225 p.p.m. Cu.

250 - 275 p.p.m. Cu.

5 cm

TASMINEX N.L.

NATONE PROSPECT

SOIL GEOCHEMICAL SURVEY

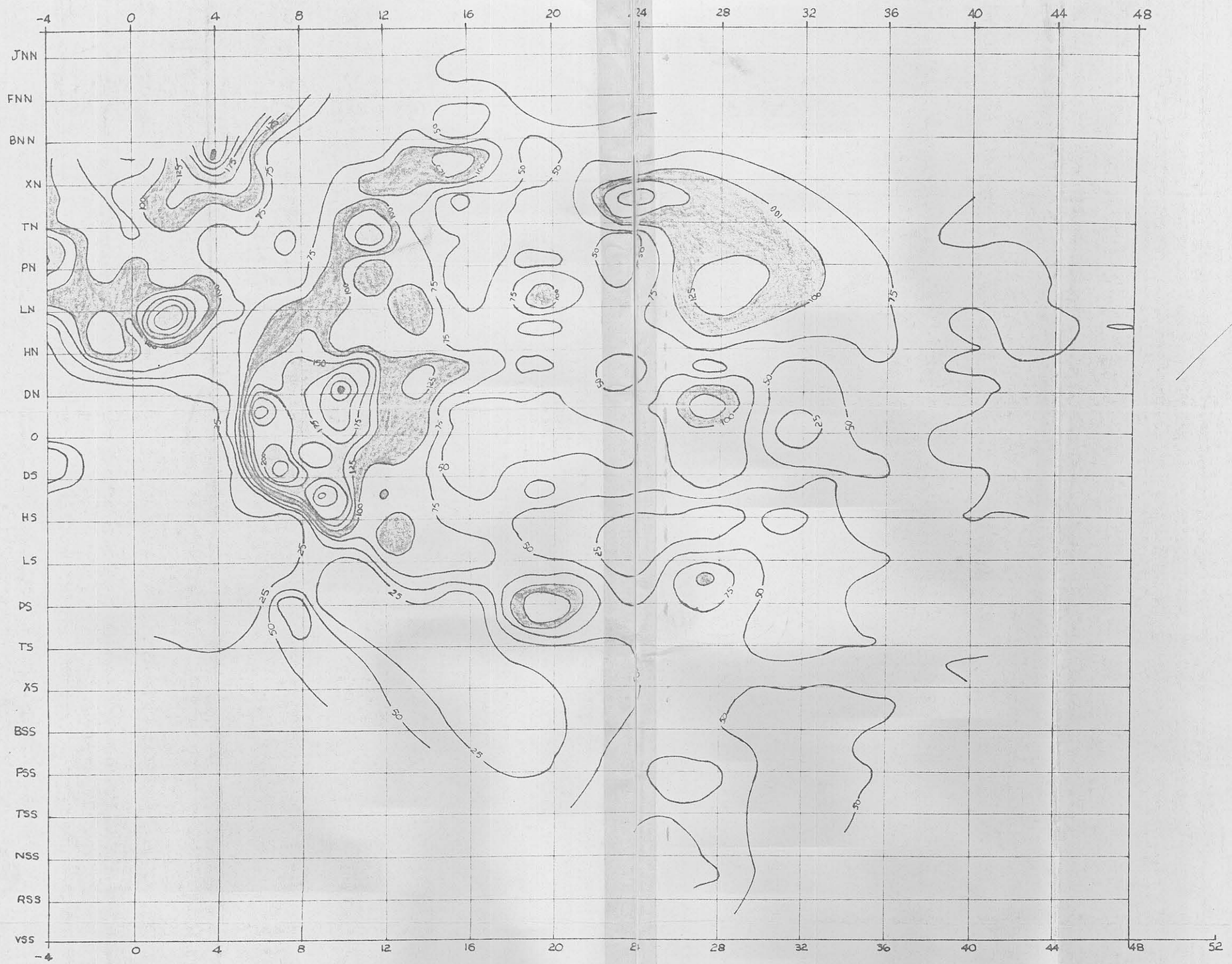
SOUTHERN AREA GRID

0 250 500 750 1000

FEET

HALL, RELPH & ASSOCIATES PTY. LTD.

974068



Legend.

100 - 125 p.p.m. Cu.

150 - 175 p.p.m. Cu.

200 - 225 p.p.m. Cu.

250 - 275 p.p.m. Cu.

5 cm

TASMINEX N.L.

NATONE PROSPECT

SOIL GEOCHEMICAL SURVEY

SOUTHERN AREA GRID

0 250 500 750 1000

FEET

HALL, RELPH & ASSOCIATES PTY. LTD.

910

017

974069

A base line is to be pegged out as shown in the accompanying map. Pegs at 100' intervals. The bearing of this base line is (approximately) 050° magnetic.

Lines at right angles are to be cleared and pegged at 200' intervals along the base line. Pegs on these lines are to be at 100' intervals. The areas to be pegged are shown in the accompanying map. Select the most westerly peg on the base line (in the granite) and label it 0. Then number the pegs in a northeasterly direction 0, 1, 2, 3, 4, 5, 6, 7 etc.

Pegs to the North west of the base line are to be lettered AN, BN, CN, etc. while those to the South east are to be lettered AS, BS, CS, DS etc. So as each peg will have a co-ordinate letter and number for example: 8DN or 12HS.

Soil samples are to be taken on each second line that is: 400 feet apart in a Northeast to Southwest direction and to be 100' apart.

Some samples will obviously lie on roads on in creeks etc., if possible a sample should be taken nearby and its co-ordinates roughly tapped in. If the distance is within 50' of another sample no sample nead be taken.

A small area is shown on the accompanying map where samples are required at 50' intervals.

The samples should come from about 18" to 24" in depth. Where ground has been cultivated try to asgertain the type of fertiliser used if any.

Magnetometer readings are to be taken at 50' intervals on the 200' lines.

018

974070

LEGEND:

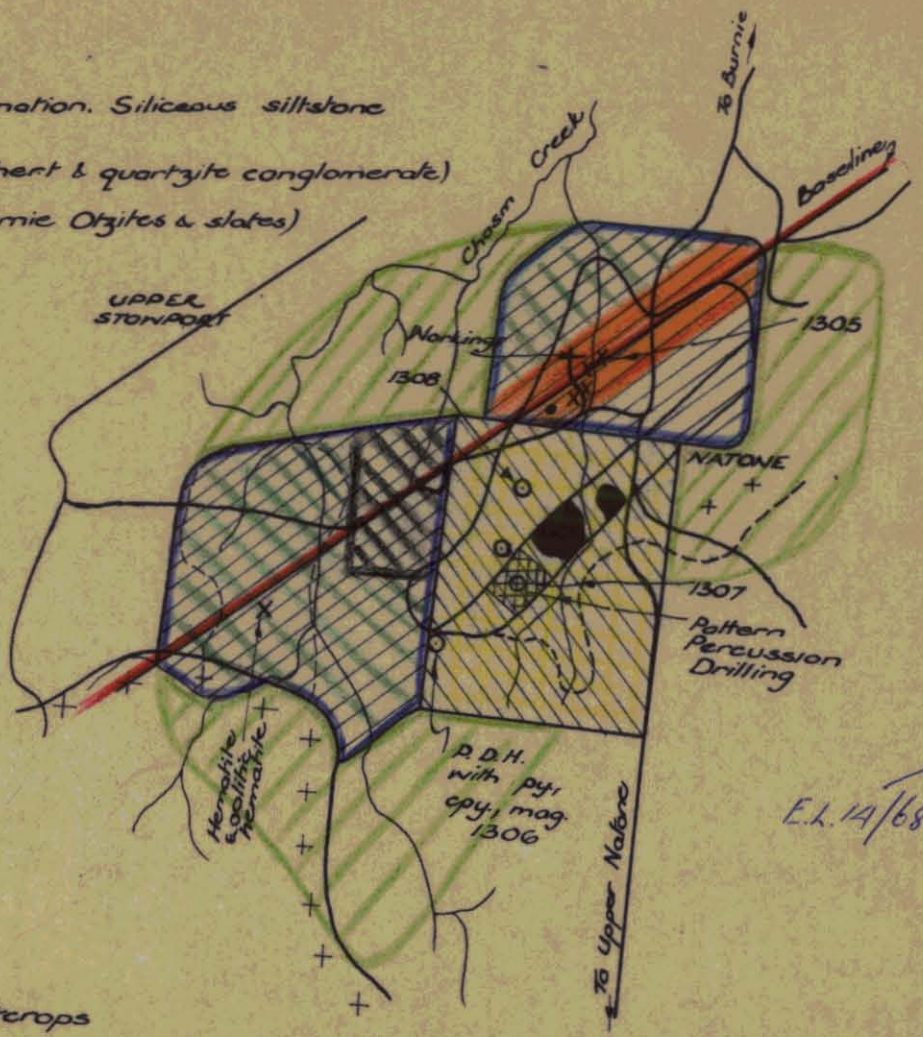
+++ GRANITE

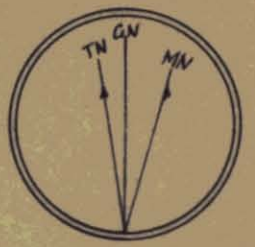
BASALT

Hematite Formation. Siliceous siltstone

Ordaicion (Chert & quartzite conglomerate)

Poterozoin (Burnie Otzites & slates)





Baseline

Boundary line

Areas to be generally prospected.

Area to be Magnetometer only.

Geochemical & Magnetometer

Excluded Area.

E.L. 14/68

Soil Samples at 50' intervals.

LEGEND:

Hematite Outcrops

Minops Area

Immediate areas of interest

Roads

Creeks

5 cm

TASMINEX N/L

NATONE PROSPECT

Scale: 0 1/4 1/2 3/4 1 MILE

019

974071

LEGEND:

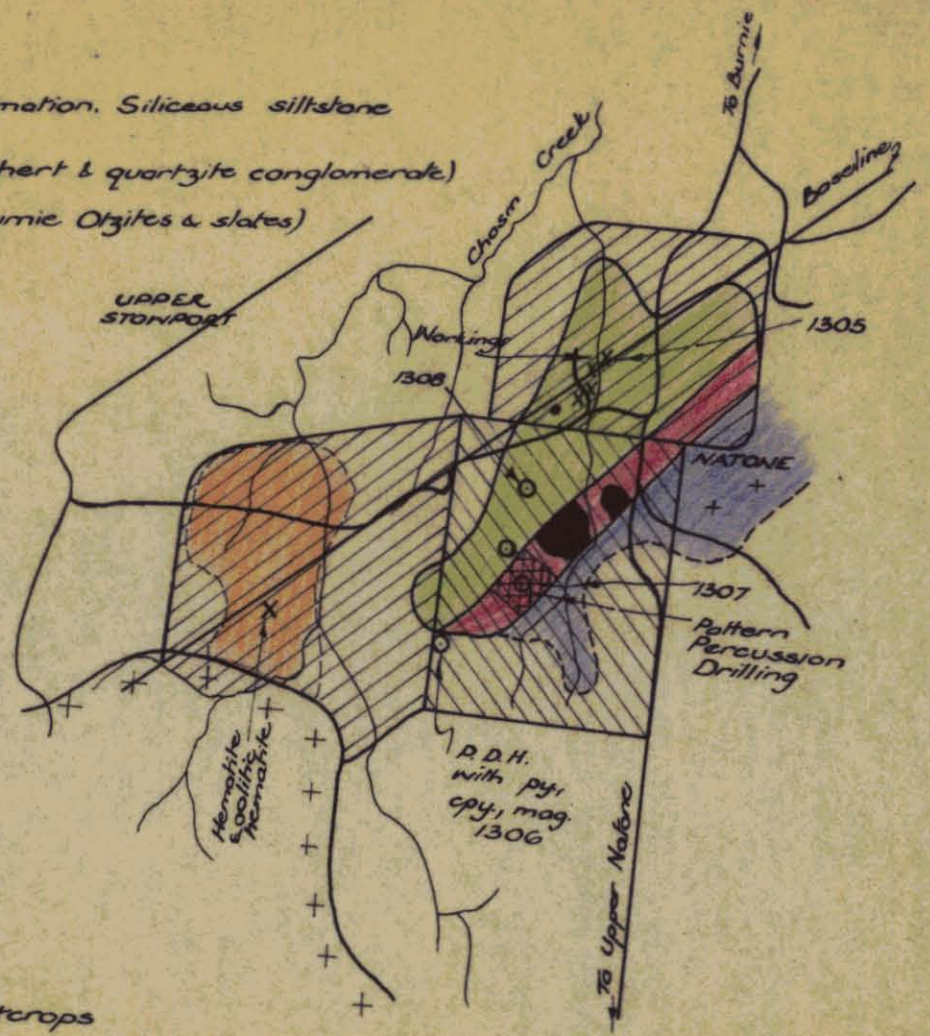
+++ GRANITE

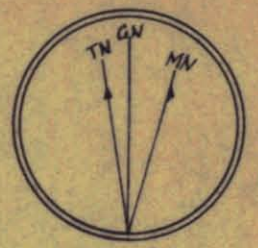
BASALT

Hematite Formation. Siliceous siltstone

Ordaician (Chert & quartzite conglomerate)

Paterozoin (Burnie Otzites & slates)





LEGEND:

Hematite Outcrops

Minops Area

Immediate areas of interest

Roads

Creeks

5 cm

TASMINEX N/L

NATONE PROSPECT

Scale: 0 1/4 1/2 3/4 1 MILE

020

974072

LEGEND:

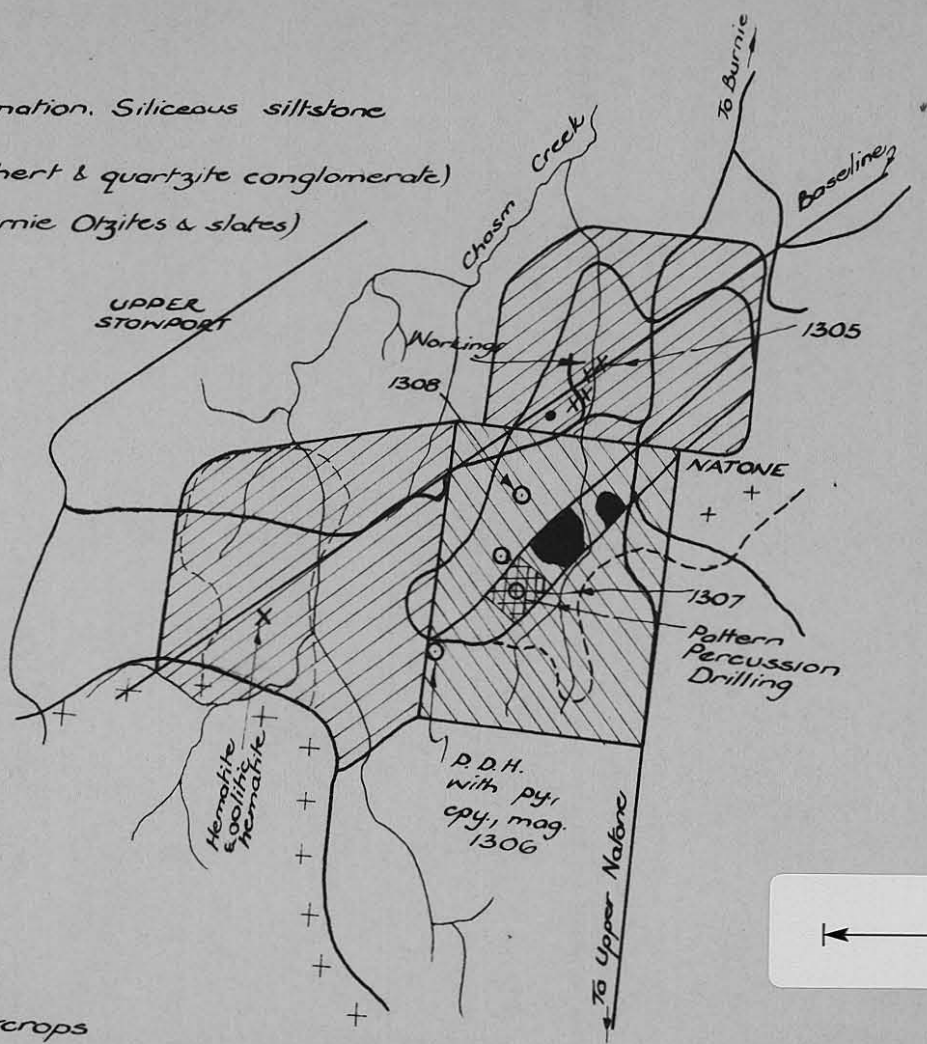
+++ GRANITE

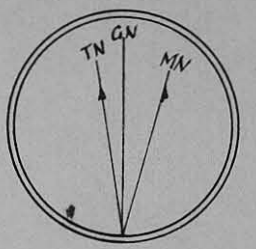
BASALT

Hematite Formation. Siliceous siltstone

Ordaicion (Chert & quartzite conglomerate)

Poterozoic (Burnie Otzites & slates)





5 cm

LEGEND:

Hematite Outcrops

Minops Area

Immediate areas of interest

Roads

Creeks

See magnetometer plans in folio - Drowing Office

TASMINEX N/L

NATONE PROSPECT

Scale: 0 1/4 1/2 3/4 1 MILE

MP 3/493/71 021

REPORT MP 5276/71

974073

E.L. 1/69

TASMINEX

(LAUREL CK. Granite)

Castleens

COPY

CHEMISTRY AND MINERALOGY OF FIVE SAMPLES

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES
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974074

Please address all correspondence to the Director
In reply quote MP 3/493/0

24 June, 1971

General Manager,
Tasminex N.L.
P.O. Box 1244,
LAUNCESTON. TAS 7250

REPORT MP 5276/71

YOUR REFERENCE:	Letter dated 31/5/71
MATERIAL:	Five rock samples
IDENTIFICATION:	1,2,3,7,8
DATE RECEIVED:	4/6/71
WORK REQUIRED:	Element scans and major heavy mineral identification

Investigation and Report by: Dr G. G. Lowder

Officer in Charge, Mineralogy & Petrology Section: Dr K. J. Henley

for F. R. Hartley
Director

023

CHEMISTRY AND MINERALOGY OF FIVE SAMPLES

974075

1. INTRODUCTION

This report is concerned with the investigation of five samples submitted to Amdel by Tasminex N.L. for both chemical and mineralogical work. The chemical work consisted of scanning each sample for 39 elements and the analytical results are presented in Table 1. The mineralogical work involved the identification of the chief mineral constituents of each sample and in particular, the examination of four of the samples for the presence of rutile and hematite.

2. PROCEDURE

The element scans were made by means of emission spectroscopy.

For the mineralogical investigation, a -36+100 mesh fraction of the crushed sample was sieved out, washed, and then separated in T.B.E. (s.g. 2.9). The resulting heavy and light fractions were examined in oils and in air by transmitted and reflected light microscopy respectively. The +36 and -100 composite fractions were also examined similarly.

Three X-ray diffraction powder photographs were prepared for the purpose of confirming mineral identifications made by optical methods.

3. RESULTS

3.1 Chemistry

Table 1 lists the data determined by the emission spectrograph scans for 39 elements in each sample. Most of the elements in each case were either not detected or showed only background values. However, each sample showed relatively high values for some elements and brief comments on these values follow.

Sample 1 is rich in iron, containing more than 10% (the upper detection limit for this method). The titanium content (5000 ppm) could be considered as moderately high, but it falls far below the

level of economic interest. Similarly, the zirconium content (4000 ppm) is anomalous, but it is far below an economic level. The only other element which is present in significant amount is tungsten, which at 500 ppm is worthy of note. Manganese, at 400 ppm, is of doubtful significance due to the high iron content and the frequent isomorphous substitution of Mn for Fe in minerals.

Sample 2 is the most interesting of all five samples. The copper and lead concentrations, both 800 ppm, while not of an economic level, must certainly be considered as above background for any normal rock. Similarly, the cobalt (500 ppm) and bismuth (1500 ppm) are anomalous. Perhaps the most striking chemical feature of this sample is the abundance of arsenic, which amounts to more than 10,000 ppm (1%, the upper detection limit).

The sample is also rich in iron and contains appreciable though not very significant amounts of titanium and zirconium. Another unusual feature of this sample is the relatively high concentrations of the rare earth elements covered in the scan (Y, La, Ce).

The element scans of the other three samples revealed little of interest. Sample 3 is relatively rich (in comparison to the other samples) in manganese and is the only sample in which barium was detected. Sample 8 contains 200 ppm of arsenic which may be of significance.

3.2 Mineralogy

Sample 1: About half of the -36+100 mesh fraction of this sample is heavier than T.B.E. This heavy fraction is very largely hematite. The hematite is of the specular variety, many grains showing a clearly micaceous habit. The mineral is blood red in colour and has an adamantine lustre in reflected light. An X-ray diffraction photograph of this material confirmed its identity and failed to show any trace of rutile or ilmenite. The titanium revealed by the analysis probably occurs in solid solution in the hematite. No zircon was seen to account for the 4000 ppm zirconium, which is a little surprising as about 0.5% zircon in the bulk sample would yield 4000 ppm in the analysis. This amount of zircon, concentrated in the heavy fraction, should be recognizable. Solution of this problem would require a more detailed investigation than is justified here.

Similarly, to locate the source of the 500 ppm of tungsten would require a more detailed investigation than was requested. Most of the remainder of Sample 1 is quartz, mica and possibly feldspar.

Sample 2: This sample is mineralogically as well as chemically interesting. The light fraction consists of silicate minerals and the heavy fraction is about one quarter of the total -36+100 mesh fraction. The approximate mineralogical constitution of this heavy fraction is as follows:

	%
arsenopyrite	45-55
fluorite	20-30
hematite/limonite	15-25
tourmaline	1-2
zircon	Trace
silicates (in composites)	3-4

The abundance of arsenopyrite accounts for the high arsenic value in the analysis and the identity of the mineral was confirmed by X-ray diffraction. There may be small amounts of other sulphides, in view of the copper and lead values in the analysis. Bismuth may occur as a sulphide or it may substitute in other minerals, such as fluorite, where it can replace calcium. Cobalt can substitute for arsenic in arsenopyrite and this is most likely to be the source of the 500 ppm of cobalt shown in the ananlysis. The rare earths, yttrium, lanthanum and cerium, show anomalous values and the most likely host mineral for these is fluorite, the identity of this mineral having been checked by X-ray diffraction. Extensive substitution of rare earths for calcium is possible and varieties of fluorite rich in rare earths have been given the names fluocerite and yttrocerite.

Sample 3: Heavy minerals are very rare in this sample, amounting to no more than 0.1% of the -36+100 mesh fraction. Hematite and leucoxene are the principal non-silicate heavy minerals, but there is also a trace of fluorite. The other main constituent of the heavy fraction is mica.

Sample 7: This sample is also very poor in heavy minerals, again with less than 0.1% of the -36+100 mesh fraction being heavier than T.B.E. The mineralogy is similar to that of Sample 3.

Sample 8: Less than 1% of the -36+100 mesh fraction of this sample consists of heavy minerals. These heavy minerals include hematite, leucoxene and biotite with a trace of fluorite and zircon.

Examination of the +36 and the -100 fractions of each sample yielded no additional mineralogical information.

4. SUMMARY AND RECOMMENDATIONS

No rutile was detected in any of the samples, so there seems little point in further more detailed investigations in relation to this mineral. The zirconium revealed by the analysis of Sample 1 may be present in a rare mineral, other than zircon. Although Sample 1 is itself not of economic value, it could be significant as a guide to another, richer source. Alternatively, the possibility of placer deposits derived from this parent rock should be given consideration.

Sample 2 is the most economically interesting sample in this group. The arsenic content of Sample 2, over 1%, is interesting but because of the limited market for this element it is doubtful economic importance. However, the anomalous lead and copper values, which are not economic themselves, are important as a guide to possible concentrations of these elements elsewhere in the vicinity. Thus, although it is not of commercial value itself, Sample 2 is evidence of significant mineralization and further investigation of the area from which it was collected seems worthwhile.

Another interesting and possibly economically important feature of Sample 2 is the anomalous rare earth values. Fluorite is considered to be the most likely source for these rare earths. It is possible that the rare earth content of the fluorite is sufficient to be of economic interest and it is recommended that further study of this mineral in Sample 2 be made. In particular, the fluorite should be analyzed for europium as the mineral is known in other parts of the world to be a host for this valuable element, the market for which is increasing.

The other three samples in this group are not of economic significance.

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TABLE 1: SEMI-QUANTITATIVE SPECTROGRAPHIC ANALYSES OF SAMPLES

974079

Results in ppm unless otherwise stated.
Detection limits in brackets.

Element	Sample				
	1	2	3	7	8
Co (5)	*	500	10	*	10
Ni (5)	*	10	*	*	10
Cr (20)	20	100	80	80	100
V (10)	10	*	*	*	*
W (50)	500	100	*	*	*
Mo (3)	3	3	*	*	*
Mn (10)	400	80	1500	100	120
Ta (100)	*	*	*	*	*
Nb (20)	50	20	30	20	20
Be (1)	1	1	3	1	3
Th (100)	*	*	*	*	*
Pt (10)	*	*	*	*	*
Pd (10)	*	*	*	*	*
Os (10)	*	*	*	*	*
Ir (2)	*	*	*	*	*
Rh (2)	*	*	*	*	*
Ru (2)	*	*	*	*	*
Cu (0.5)	5	800	5	5	20
Pb (1)	8	800	5	8	15
Zn (20)	30	150	*	*	*
Sn (1)	80	10	1	*	1
Cd (3)	*	*	*	*	*
Bi (1)	1	1500	3	*	20
Ag (0.1)	0.1	20	*	*	0.1
Au (3)	*	*	*	*	*
Ga (1)	15	3	15	20	15
Ge (1)	*	*	*	*	*
As (50)	*	>10000	*	*	200
Sb (30)	*	*	*	*	*
Zr (10)	4000	2000	1000	1000	1000
In (10)	*	*	*	*	*
Fe (100)	>10%	10%	3%	1%	3%
Ba (50)	*	*	200	*	*
Sr (10)	*	*	*	*	*
Y (10)	10	300	10	10	*
La (100)	*	600	*	*	*
Ce (300)	*	1000	*	*	*
Ti (100)	5000	1000	2000	2000	3000
Sc (50)	*	*	*	*	*

* Not detected at limit quoted

974080

028

HALL, RELPH & ASSOCIATES PTY. LTD.
GEOLOGICAL & EXPLORATION CONSULTANTS

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3rd November, 1970.

TASMINEX N.L.

MISCELLANEOUS GEOLOGICAL REPORT ON
"COPPER KING" PROSPECT, ULVERSTONE
"COPPER QUEEN" PROSPECT, ULVERSTONE
REDWATER CREEK IRON PROSPECT, RIANA

EL 1/69.

1. "COPPER KING" PROSPECT

The prospect was visited on 29th October 1970, in company with Mr. Farrow.

At the instigation of Tasminex N.L., a considerable amount of earthmoving had been carried out at the prospect to expose the lodes, and a geological appraisal of the prospect in the light of fresh exposures was requested.

Copper mineralization was observed to occur within several narrow, sub-parallel, north-trending shear zones in slate. The material of the shear zones is bluish-grey, slickensided slate, a feature shared by two other small copper showings nearby, viz; Natone and the "Copper Queen". Malachite, bornite, chalcopyrite and pyrite occur in quartz stringers in the shear zones. Pyrite is the predominant sulfide mineral; chalcopyrite and bornite occur in trace amounts only. Malachite, which is the weathering product of the two sulphide minerals mentioned above, is reported to have been present in some quantity, and was apparently worked as ore during an earlier mining episode.

The occurrence of rich malachite ore in shear zones is well-documented, much of Australia's early copper mining industry having been founded on such deposits. The

malachite ore is short-lived, passing into primary sulphide material below the water table. Without exception, the primary ore is leaner than the secondary (malachite) ore and only a handful of mines have remained economic once the ore above the water table had been extracted.

Since the primary sulphide material at the "Copper King" prospect is definitely sub-economic, and there is very little malachite in evidence above the water table, it is recommended that the prospect be dropped.

EL 1/69

2. "COPPER QUEEN" PROSPECT

The "Copper Queen" prospect was described in Hall, Relph & Associates' report dated 18th August, 1970. The conclusion drawn at that time was that the deposit was uneconomic. However, the deposit was diamond drilled by Tasminex N.L. in October, 1970, and the available core, from 0 to 200 feet, was submitted for geological examination.

Relph / Brief notation only - not discussed. Different report?

The sequence examined in the core was similar to that exposed in the cuttings at the "Copper King", viz; bluish-grey, slickensided slatey shear zones in slate and greywacke. A little fine-grained pyrite is developed in quartz veinlets in the shear zones. No copper mineralization was observed.

At the time of examination, the drilling crew was experiencing some difficulty in continuing the hole, and it is recommended that the drilling programme be discontinued. There is very little likelihood of economic copper mineralization being encountered at the prospect.

3. REDWATER CREEK (LOYATEA) IRON PROSPECT

EL 17/68

Two drill holes were emplaced at the prospect at the instigation of Tasminex N.L. and the core submitted for examination.

030

DDH 1

0 - 30 feet	No recovery
30 - 40 feet	Massive magnetite rock with random veinlets of olivine (?).
40 - 93 feet	(end of hole) Fine-grained biotite granite and granite porphyry.

DDH 2

0 - 13 feet	No recovery
13 - 27 feet	Fine-grained granite rock
27 - 100 feet	Fine-grained greywacke, medium-grey in colour for the most part. Contains sections of biotite-rich material and of light grey quartzite.
123 - 134 feet	(end of hole) Porphyritic granite.

It is recommended that no further action be taken at this prospect.

HALL, RELPH & ASSOCIATES PTY. LTD.

JH/lz

B.E. Lord. D.Sc.