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GEOPHYSICAL PROGRESS REPORT

ON

BIRCH INLET E.L. 9/74 TASMANIA

MICROFILMED

by

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OPEN FILE

September, 1977.

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CONTENTS PAGE

INTRODUCTION

E.L. 9/74 covers approximately 280 square kilometres immediately south of Macquarie Harbour, Tasmania. Geopeko is exploring the area in a joint venture with Union Oil Development Corporation. Exploration in the area is hampered by access problems due to large terrain variations and thick vegetation.

Previous geophysical work carried out by Union Oil has been coverage of about two thirds of the area with two airborne E.M. magnetometer surveys and some induced polarisation surveys over a large reconnaissance grid.

Geophysical field exploration during the 1976-1977 field season by Geopeko has been ground location of airborne E.M. anomalies and investigation of these both geologically and geochemically.

This report discusses the results of both previous Union Oil work and the Geopeko geophysical programme.

a) TURAIR Survey

This survey, flown by Scintrex in 1973 covers the northern one third of the Birch Inlet area. Data was presented as analogue flight tapes and a recovery plan with E.M. anomalies plotted.

Aeromagnetics

From the analogue tapes the author has compiled an aeromagnetic contour plan. Because of poor flight line positioning and recovery only 18 of the 46 flight lines were used in the compilation.

Features of the data are:-

1. A dominant N-S magnetic high extending from the southern survey boundary to the northern ½ of the area.

2. Isolated peaks on the flanks of this feature. These peaks appear to be part of a shorter parallel linear feature which is distorted in the compilation by poor flight line recovery.

Electromagnetics

Data recorded was the normal TURAM parameters of field strength ratio (F.R.S.) and phase difference (P.D.)

Features of this data are:-

1. Most of the anomalies selected by Scintrex are very weak and may be "noise" only. There is however, a scarcity of case history information for comparison with the anomalies recorded.

2. Very large F.S.R. anomalies have been recorded on some lines in the southern part of the area. These anomalies have been ignored by Scintrex indicating that they may be due to spurious instrumental effects. All those anomalies cluster about anomaly Zone L which suggests that some of them may be real.

3. Five of the largest anomalies recorded are:-

Zone L.	This includes anomalies 47, 43, 41 and the large amplitude anomalies mentioned above.
Anomaly 30.	This is quite near another fair anomaly not mentioned by Scintrex on line 21W (fid 1735).
Anomaly 22.	
Anomalies 44 & 46.	
Anomaly 6 (Zone G).	

b) GEOEX H-400 Survey

This survey flown by Geoex in 1975 covers the southern one third of the Birch Inlet area. Data was presented as analogue flight tapes and a recovery plan with E.M. anomalies plotted.

Aeromagnetics

From the analogue tapes the author has compiled an aeromagnetic contour plan. Flight line positioning and recovery is good and all lines were used in the compilation.

Features of the data are:-

1. A large N-S magnetic high in the western half of the survey area. This correlates with a large Rhyolite unit (U.O.D.C. geology).

2. Small isolated magnetic anomalies were recorded in the eastern part of the area and may be worthy of further investigation.

3. In the SE corner of the area a broad magnetic high is associated with a significant E.M. anomaly.

Electromagnetics

Data recorded was dual frequency (340 Hz and 1070 Hz) out-of-phase response.

Features of the data are:-

1. Most anomalies selected by Geoex are very weak and are probably noise.

2. Only two significantly recognisable anomalies were recorded. These are:-

Zone 8 consisting of anomalies on 3 adjacent lines.

Zone 2 one reasonable anomaly on line 22 has been correlated with a very weak response on the adjacent line (23).

These anomalies are very weak compared to published case histories.

U.O.D.C. GEOPHYSICS

During the 1975 field season Union Oil Development Corporation (U.O.D.C.) carried out widely spaced (800 metres) I.P. - resistivity traverses within the central and southern one thirds of the Birch Inlet area.

Aspects of the data are:-

1. I.P. anomalies of up to 40mV/v (4%) above a background of 10mV/v on the western ends of the lines seem to coincide with a carbonaceous shale unit of the Thirkell group (U.O.D.C. geology).

2. Broad I.P. highs on the eastern end of the lines are probably the result of a decrease in overburden thickness coinciding with an increase in topographic elevation.

3. There are no apparent resistivity anomalies which may be associated with possible orebodies. Variations in this data correlate well along the N-S strike and are probably related to regional geological features.

1976 FIELD SEASON GEOPHYSICS

Geophysics carried out by Geopeko during this period consisted of V.L.F., E.M. follow up of airborne E.M. anomalies from the two airborne surveys. Some I.P. and magnetics was also employed. Follow up E.M. and magnetics was carried out along one U.O.D.C. grid line (line 160N).

Aspects of the geophysical data can be summarised:-

a) V.L.F. Electromagnetics

A surfeit of moderate to strong V.L.F. anomalies was recorded in the area and any one anomaly could be related to an orebody. Comparison of the recorded anomalies with case history data both from Tasmania (B.M.R.) and elsewhere indicates that many of the recorded anomalies are very good. Many of the broad anomalies are characteristic of deep seated conductors or they may be the result of recording across conductors at an oblique angle. Alternatively they may be due to broad regional geological effects.

The V.L.F. results need to be considered with three aspects in mind:-

1. Any E.M. method is unable to discriminate between ionic and electronic conductors. In this environment conductive shear zones etc. give rise to large E.M. anomalies comparable to those expected from ore bodies.

2. In the Tasmanian environment near surface and subsurface resistivities are very high. Consequently even very poor conductors provide a large conductivity contrast and are easily detected by E.M. techniques.

3. Pyritic - carbonaceous shale is widespread in this geological environment and responds very well to this E.M. method.

Further E.M. work in this area needs to be far more discriminatory in this application and any worthwhile anomalies will need to be followed up with I.P. which is more definitive.

b) Magnetics

No interesting magnetic anomalies have been recorded. Some of the data has been useful for positioning surface traverses by comparison with the aeromagnetics. In some instances it is obvious that the ground follow up was carried out in the wrong place because of bad flight path recovery and/or bad plotting of anomaly positions on to base maps.

c) Induced Polarisation

I.P. was recorded on only two prospects in the area and the results fit well with the pattern of the U.O.D.C. data.

d) Prospects

No outstanding prospect has emerged. The better of them from the geophysical results are:-

Viking I,
The western end of U.O.D.C. line 160N,
Geoex A.E.M. anomaly No.8.

CONCLUSIONS

Geophysical data indicates that both ground and airborne E.M. techniques are of limited use.

The worth of magnetics as an exploration tool has not been established. If magnetics can serve as a focussing tool for orebody location its applicability poses no problems apart from those imposed by the geography.

Apart from the aeromagnetics, the results to date provide no regional focussing tool in this area. Geology or geochemistry may have to provide the focussing tool to the prospect stage.

Further geophysical surveys in the follow up of airborne anomalies or over prospect grids should encompass both E.M. and I.P. E.M. methods can be used to locate airborne E.M. anomalies and massive conductors but the I.P. method is more specific in delineating subsurface conductors. In theory massive conductors do not provide the ideal I.P. target, in practice most orebodies have some I.P. signature.

RECOMMENDATIONS

The proposals below for further work in the coming field season are tentative only and need to be reviewed in conjuction with geological and geochemical results.

a) Northern Area - TURAIR Survey

Viking I. The coincident E.M./I.P. anomaly although probably the response of carbonaceous shales needs to be investigated geologically. If the geology is encouraging further geophysics may be warranted.

TURAIR Anomaly Zone L. Follow up geophysics to date offers little encouragement in this area. The area is characterised by a number of reasonable TURAIR anomalies and for this reason further work may be warranted.

b) Central Area - Partly covered by U.O.D.C. grid.

No prospects have emerged from the wide spaced U.O.D.C. geophysics. Further geophysics if any will be on prospects selected on the basis of geology.

An airborne magnetic-electromagnetic survey over this area may be worth considering.

c) Southern Area - Geoex Survey

Viking 10. Follow up geophysics on this prospect offers little encouragement. At this stage it is a geochemical prospect and further geophysics will depend on the nature and favourability of the geochemical results.

The western end of U.O.D.C. line 160N. The coincident E.M./I.P. anomalies are probably related to underlying carbonaceous shale, as at Viking I.

Detailed geology is the first priority in this area.

A.E.M. anomaly No.8. This area has a coincident aeromagnetic and A.E.M. anomaly. The A.E.M. anomaly is the best within the survey area. The results of ground reconnaissance surveys indicate that more work is required to the south.

Follow up of some of the isolated aeromagnetic anomalies in the western half of the area may be warranted.

TURAIR ANOMALY G (Viking 1)

This area was selected by Scintrex on the basis of four very weak anomalies. Their interpretation indicates a high conductivity source at about 200 feet depth and places a high priority on this locality. Ground follow up consisted of 3 E-W lines which were covered with V.L.F. E.M. and one line with magnetics and I.P./resistivity.

I.P. Data

The I.P.character on line 100N is flat from 20E to 300E indicating a background chargeability of about 1% (M 1). West of 0.0E the values increase to about 5%. Further work to the west is needed to adequately define this anomaly.

Resistivity Data

The apparent resistivity data on line 100N shows little variation with values ranging from 200 to 400 ohm metres apart from a 600 ohm metres high at 0.0E.

Magnetics

The magnetic character, recorded only on line 100N is flat.

V.L.F. Data

All lines suggest the existence of a broad, large magnitude quadrature anomaly west of the area covered. This correlates well with the increase in I.P. chargeability values to the west.

Apart from this, the only significant V.L.F. anomaly is on line 100N at about 125E (in-phase 25%, quadrature 5%). The high in-phase/quadrature ratio indicates a good conductor.

In-phase anomalies at 175W on line 0.0 (20%) and at 100W on line 100S (8%) are ill defined and probably related to rear surface sources.

Conclusions and Recommendations

The V.L.F. anomaly on line 100N may be of significance but lack of correlative I.P. response tends to downgrade it. The V.L.F. and I.P. data suggest a zone of poor conductivity and high chargeability to the west of the area investigated. These anomalies could be the response of carbonaceous shale in this area or disseminated sulphides.

Further work in this area will depend on geological and geochemical interest. On the geophysical results alone however, further work to the west is warranted.

TURAIR ANOMALY No. 50. (Viking 2)

Scintrex describe this isolated anomaly as a "defined F.S.R. anomaly with $\sigma.t.$ = 100 mhos". It is a very weak anomaly. Two E-W lines were read with V.L.F. E.M. and one line (150S) with magnetics.

The magnetic character is flat.

The V.L.F. data shows no obvious anomalies. Some in-phase displacements of up to 15% may be related to near surface conductors. The data on line 150S is similar to that from Anomaly G whereby there appears to be a significant (25% or more) quadrature response to the west. (west of 700W).

The similarity of the V.L.F. response to the west with that recorded about 500 metres south at Anomaly G strengthens the possibility of these anomalies being caused by a carbonaceous shale unit. Further work to the west is warranted provided there exists geological and/or geochemical incentive.

TURAIR ANOMALY NO. 23. (Viking 19)

Scintrex describes this anomaly as "doubtfull" in which case it is probably non-existant. Surface follow up consisted of magnetics and V.L.F. on one E-W line.

The magnetic data increases about 100 n.T. to the east. The surface magnetic character however does not fit with the aeromagnetic data. TURAIR anomaly No.23 plots on the centre of a broad 100 n.T. ridge. Either the ground work was carried out west of the A.E.M. anomaly or the magnetometer was malfunctioning. From the ground magnetic data the second possibility is unlikely.

The V.L.F. data shows a noisy but reasonably well defined anomaly very large in magnitude. The in-phase response ranges from -20% to +47% and the quadrature from -10% to +13%. The large in-phase/quadrature ratio suggests a good conductor. The V.L.F. profiles indicate two conductors one below 150W and another below 75E. This is by far the largest E.M. anomaly recorded in the Birch Inlet-Elliot Bay areas and apparently has not been detected by the TURAIR survey.

The topographic relief in this area may be the cause of the broad large magnitude anomaly (c.f. B.M.R. results) but data from other areas with equal or more severe topography is not similar. V.L.F. topographic effects are proportional to strata conductivity and the large effect in this area could be the combined effect of topography and more conductive rocks.

This area is associated with one anomalous stream sediment sample.(Pb). The large E.M. response and the slight geochemical encouragement possibly warrant coverage with soil geochemistry and more detailed geophysics.

TURAIR ANOMALOUS ZONE L. (Viking 4)

The main airborne anomaly associated with this zone is described by Scintrex as "a distinct and well defined anomaly with a $\sigma.t.$ = 18 mhos". I consider this region encompassing anomalies 41, 43, 47 and others (see above) as the most encouraging within the TURAIR survey area.

Ground follow up of this zone (Anomaly 43) consists of two short orthogonal traverses (E-W and N-S) of V.L.F. Ground coverage has been insufficient to adequately define any E.M. anomalies in the area. The data shows no obvious anomalies although the data on the N-S line suggests there may be an anomaly further to the north.

Ground geophysics and stream sediment geochemistry give no encouragement for further work in the area. The airborne E.M. results, if they are to be considered significant, do provide incentive for further work. More protracted ground geophysics accompanied by soil geochemistry could be considered, however, the difficulty of access for adequate anomaly location poses a problem.

TURAIR ANOMALY NO. 47. (Viking 3)

This airborne anomaly is quite distinct but Scintrex suggest that it could be spurious. They obtained a $\sigma.t >$ 100 mhos (i.e. a good conductor).

Ground reconnaissance consists of V.L.F. coverage along three short lines one E-W and two N-S. No anomalies are obvious in the data which has moderate amplitude (up to 18% in-phase) noise. Similarly to Zone L the ground covered is insufficient to adequately locate and define any E.M. anomaly.

GEOEX A.E.M. ANOMALY NO.1 (Viking 21)

This low priority airborne anomaly has been followed up with three short E-W lines and one N-S line of V.L.F. coverage.

The data cannot be interpreted conclusively but there is a suggestion of a large magnitude (25% in-phase) anomaly west of 100W on line 100S. The apparent large in-phase/ quadrature ratio suggests a good conductor. There has been insufficient ground coverage to adequately locate and define this A.E.M. anomaly if it is real.

Further work in the form of more E.M., I.P. and magnetics will need to be justified by geological or geochemical indications.

VIKING 10 GEOEX A.E.M. ANOMALY NO.2

This A.E.M. anomaly is described by Geoex as "a "C" category anomaly", "low in amplitude with a good conductivity ratio of 1.1". I consider it one of only two worthwhile anomalies recorded in the survey. Ground reconnaissance follow up has been carried out along three long (1400 metres) N-S lines 100 metres apart. The line direction chosen is puzzling and is of little use in locating N-S conductors. V.L.F. E.M. was recorded along the three lines 100W, 0 and 100E and along one short E-W line (line 156N). (This number relates to the U.O.D.C. grid northings and is 400 metres north of the recon. base line which is U.O.D.C. line 152N). Gradient array I.P. and magnetics was recorded along line 00E.

V.L.F. Data

Three distinct in-phase anomalies with magnitudes in the region of 20% or more were recorded on each line and the correlation from line to line is very good. The anomalies indicate good conductors at moderate depth (100 metres) with shallow depths to top. Apparent resistivity values are in the range 300 to 700 ohm metres indicating a skin depth of about 100 metres.

Magnetics

The magnetic data on line 0.0E is essentially flat with a broad high of about 75n.T. from 300N to 400N. The airborne E.M. anomaly was associated with a broad aeromagnetic high of about 60n.T. This fact indicates either the ground work was carried out in the wrong place or the magnetometer was not functioning correctly.

I.P. Data

The chargeability data on line 00E is essentially flat indicating a background of 1% to 1.5% (M 1).

Resistivity Data

The apparent resistivity data is noisy but suggests some lows (of the order of 100-200 Ω.m) are associated with the V.L.F. anomalies.

Conclusions and Recommendations

As the surface data was apparently recorded along strike the results are of little use. The good V.L.F. anomalies correlate well across strike (?) and are probably related to real subsurface conductors. The absence of any anomalous I.P. response and the V.L.F. anomaly directions suggest they are related to ionic conductors which may be fault or fracture zones. If so the data illustrates clearly the inability of V.L.F. methods to discriminate between conductor types.

Soil geochemical results provide encouragement for further work in this area. Prior to establishing a grid the geological strike should be firmly established. Further geophysics should employ I.P., S.P. and magnetics. Extension of the ground E.M. work would provide, at best, inconclusive results and spurious anomalies.

The geophysical data indicates that A.E.M. Anomaly No.2 (Viking 10) has not been located. It could however be related to one of the E-W anomalies.

GEOEX A.E.M. ANOMALY NO.3. (Viking 11)

This anomaly is described by Geoex as "a possible anomaly" and was not recommended for follow up. Ground geophysics has been four E-W lines 100 metres apart which were covered with V.L.F. data and one N-S line with V.L.F. and magnetics.

The magnetic data is flat.

The V.L.F. data is not encouraging. Small amplitude (15%) "shallow type" anomalies were recorded on lines 148.5N and 149.5N. The reverse quadrature response indicates conductive overburden which may be the anomaly cause.

No further work is justified in this area.

U.O.D.C. LINE 160N

Follow up V.L.F. E.M. and magnetics was carried out along line 160N and along part of lines 100 metres to the north and south. Line 160N was originally covered by U.O.D.C. with gradient array I.P. Their results show:-

1. A general background chargeability of about 10mV/v (1%).
2. Anomalies of about 30mV/v on the western end of the line (I.P. anomalies No.4 and 5). Viking 6 Viking 7
3. A broad chargeability anomaly of 40mV/v on the eastern end of the line (I.P. anomaly No.10). Viking 9 (A.E.M. 4) This is in the vicinity of A.E.M. anomaly No.4 which is described by Geoex as "a possible anomaly".
4. A questionable anomaly of 17mV/v at 0.E (I.P. anomaly No.11). Viking 8.

The magnetic data is featureless.

The V.L.F. data shows several features:-

1. The data east of the baseline contains large magnitude and high frequency,in-phase and quadrature, responses. This indicates:-

    1. The sources are very shallow.
    2. The large "normal" quadrature effects are indicative of very poor conductors.

2. There is a broad in-phase cross over at 450E of about 20% which may be significant. This has no associated I.P. or geochemical anomaly.

3. The V.L.F. data from 1500W to 1000W shows three large magnitude (up to 20% or more) in-phase anomalies which have associated poor quadrature response suggestive of good conductors. Although these anomalies are no different from many other recorded in the Birch Inlet/Elliot Bay area they are interesting because of the associated I.P. anomaly(s) at this end of the line.

The I.P./E.M. anomalies at the western end of the line are worthy of more detailed coverage. Carbonaceous shale could be the cause.

GEOEX A.E.M. ANOMALY NO.7 (Viking 15)

This airborne anomaly was not considered worthy of ground follow up by Geoex. Follow up consisted of a traverse (approx. E-W) along the bed and up water falls (cascades) of Hales River. V.L.F. E.M. and magnetic data was recorded.

The magnetic data is flat.

A very large and sharp in-phase (50%) and quadrature (35%) anomaly was recorded.

This is a very interesting E.M. anomaly but further work will depend on geological and geochemical considerations.

GEOEX A.E.M. ANOMALY NO. 8. (Viking 17)

This zone consists of airborne anomalies on three adjacent lines, is considered to be of high priority by Geoex and is by far the most encouraging anomaly(s) of this survey. The anomalies are however very weak. The anomalous zone correlates with the northern end of a NW-SE trending aeromagnetic high of about 100n.T. Ground follow up has been in the form of one E-W traverse read with V.L.F.E.M. and magnetics.

The surface magnetics indicate the work done is north of the airborne anomaly as only the eastern edge of the magnetic high has been covered.

The V.L.F. data shows a large magnitude (40%) in-phase anomaly centred at about 75E. The ground traverse is on the edge of a steep easterly rise and the V.L.F. data may be distorted by effects from this.

The poor magnetic correlation indicates the main E.M. anomaly is further south. The E.M. anomaly is good and on geophysical grounds alone further work to the south in the form of I.P., magnetics and E.M. is warranted.

GEOEX A.E.M. ANOMALY NO. 9 (Viking 18)

This airborne anomaly is about 500 metres east of Anomaly No.8 and is described by Geoex as "a possible anomaly".

Ground follow up consists of one E-W line of V.L.F. and magnetics. The magnetics is flat and the V.L.F. data is not encouraging. The aeromagnetic data indicates this A.E.M. anomaly is on the eastern flank of a large magnetic anomaly which is not evident from the surface data. As with E.M. anomaly No.8 the follow up work here has probably been too far north.

Further work at this stage is not warranted.

GEOEX A.E.M. ANOMALY NO. 10 (Viking 16)

This airborne anomaly is considered "a possible anomaly" by Geoex.

Follow up in the form of one V.L.F. traverse (bearing 30°N) has revealed a large in-phase (40%) anomaly which by itself is encouraging.

Further regional geochemistry is required in this area.

GEOEX A.E.M. ANOMALY NO. 11 (Viking 14)

Geoex describe this anomalous zone as being made up "of two possible anomalies" which could be "altitude effects".

Ground follow up consisted of two E-W lines of V.L.F. and one line (100N) of magnetics.

The magnetic data is flat.

The V.L.F. data offers no encouragement.

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NUMBER	PLAN REFERENCE	PLAN
1	3373 S/A	VIKING 1 TURAIR ANOMALY G: IP, MAG, VLF-EM
2	3379 S/A	TURAIR ANOMALY No 50: VLF-EM,MAG
3.	3377 S/A	TURAIR ANOMALY No 23: VLF-EM,MAG
4	3365 S/A	TURAIR ANOMALOUS ZONE L: VLF-EM
5.	3378 S/A	TURAIR ANOMALY No 47:VLF-EM
6.	3366 S/A	EM ANOMALY No 1: VLF-EM
7.	3373 S/A	VIKING 10 (EM ANOMALY No 2): VLF-EM.
8.	3376 S/A	VIKING 10 (EM ANOMALY No 2.) VLF-EM.
9	3374 S/A	VIKING 10 (EM ANOMLAY No 2.) IP, MAG.
10	3367 S/A	EM ANOMALY No 3 : VLF-EM, MAG
11	3380 S/A	V.O.D.C. LINE 160N: VLF-EM.
12	3368 S/A	EM ANOMALY No 7: VLF-EM, MAG.
13	3369 S/A	EM ANOMALY No 8: VLF-EM, MAG
14	3370 S/A	EM ANOMALY No 9: VLF-EM, MAG
15	3371 S/A	EM ANOMALY No 10: VLF-EM
16	3372 S/A	EM ANOMALY No 11: VLF-EM,MAG.

5 cm

300W 200W 100W 0 100E 200E 300E 400E

5.0 %
4.0 %
3.0 %
2.0 %
1.0 %
0
- 1.0 %

M_1
M_2
M_3
M_4

GRADIENT IP
Gradient = 25 metres
LINE 100N

(Ω-m)
800
700
600
500
400
300
200
100
0

RESISTIVITY
LINE 100N

63000
63000
62000

MAGNETICS
LINE 100N

300W 200W 100W 0 100E 200E 300E 400E

+ 25 %
+ 20 %
+ 15 %
+ 10 %
+ 5 %
0
- 5 %
- 10 %
- 15 %

IN-PHASE
QUADRATURE

LINE 100N

100S 0 100N

IN-PHASE
BASE LINE
QUADRATURE

+ 20 %
+ 15 %
+ 10 %
+ 5 %
0
- 5 %
- 10 %
- 15 %
- 20 %

QUADRATURE
IN PHASE

LINE 00S

+ 20 %
+ 15 %
+ 10 %
+ 5 %
0
- 5 %
- 10 %
- 15 %
- 20 %

IN-PHASE
QUADRATURE

LINE 100S

VLF (NWC)

BASE LINE (BEARING GRID NORTH)
N
NWC
W
E
SURVEY LINE
(BEARING GRID EAST)
DIRECTION OF READINGS
S

300W 200W 100W 0 100E 200E 300E 400E

100S 0 100N

319032

GEOPEKO LTD. Geophysical Surveys.	Instrument	Huntec I.P. Geometrics Unimag	Datum	63000nT	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	Geonics EM16 S. Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	VIKING 1 TURAIR ANOMALY G
Plan No. 3373 S/A 001	Scale Fact.		Date	Feb .77	Cont. Int.		PLAN SHOWS	Reconnaissance Geophysics 77-1205

500W 400W 300W 200W 100W 0 100E 200E 300E 400E

+25%
+20%
+15%
+10%
+5%
0
-5%
-10%
-15%
-20%
-25%

QUADRATURE
IN-PHASE

VLF (NWC)
LINE 00S

700W 600W 500W 400W 300W 200W 100W 00 100E 200E 300E

+25
+20
+15
+10
+5
0
-5
-10
-15
-20

QUADRATURE
IN-PHASE

VLF(NWC)
LINE 150S

63000
nT
62200
62000

MAGNETICS
LINE 150S

NWC
W
E
SURVEY LINES
BEARING GRID EAST
DIRECTION OF
READINGS

5 cm

319033

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16 Geometrics Unimag	Datum	63000nT	Hor. Scale	1cm to 50m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	TURAIR ANOMALY No50
Plan No. 3379 S/A 002	Scale Fact.	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics 77-1205 .2

300W 200W 100W 0 100E 200E 300E

+50%
+40%
+30%
+20%
+10%
0
-10%
-20%
-30%
-40%

63000

nT

62000

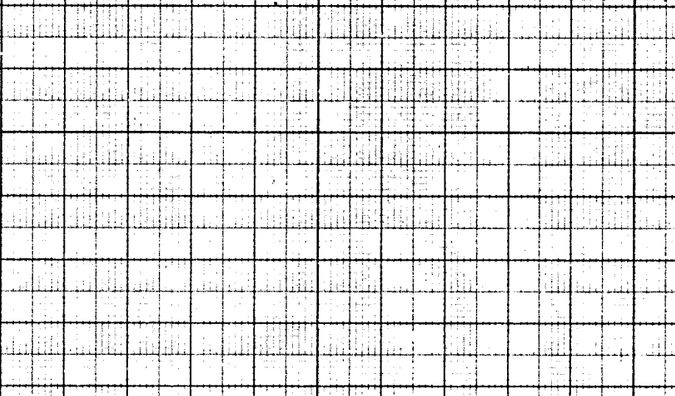
300W 200W 100W 0 100E 200E 300E

IN-PHASE

QUADRATURE

VLF (NWC)

MAGNETICS



5 cm

319034

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16 Geometrics ~~Unimag.~~	Datum	63000nT	Hor. Scale	1cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	TURAIR ANOMALY No 23
Plan No. 3377 S/A 003	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics 77-1205 3

300S 200S 100S 0 100N 200N 300N

NORTH SOUTH LINE

25 %
20 %
15 %
10 %
5 %
0
5 %
10 %
15 %
20 %
25 %

QUADRATURE

IN-PHASE

NORTH SOUTH LINE
BEARING GRID NORTH SOUTH

NWC

W

EAST WEST LINE
E
BEARING GRID EAST WEST

DIRECTION OF READING

200W 100W 0 100E 200E

EAST WEST LINE

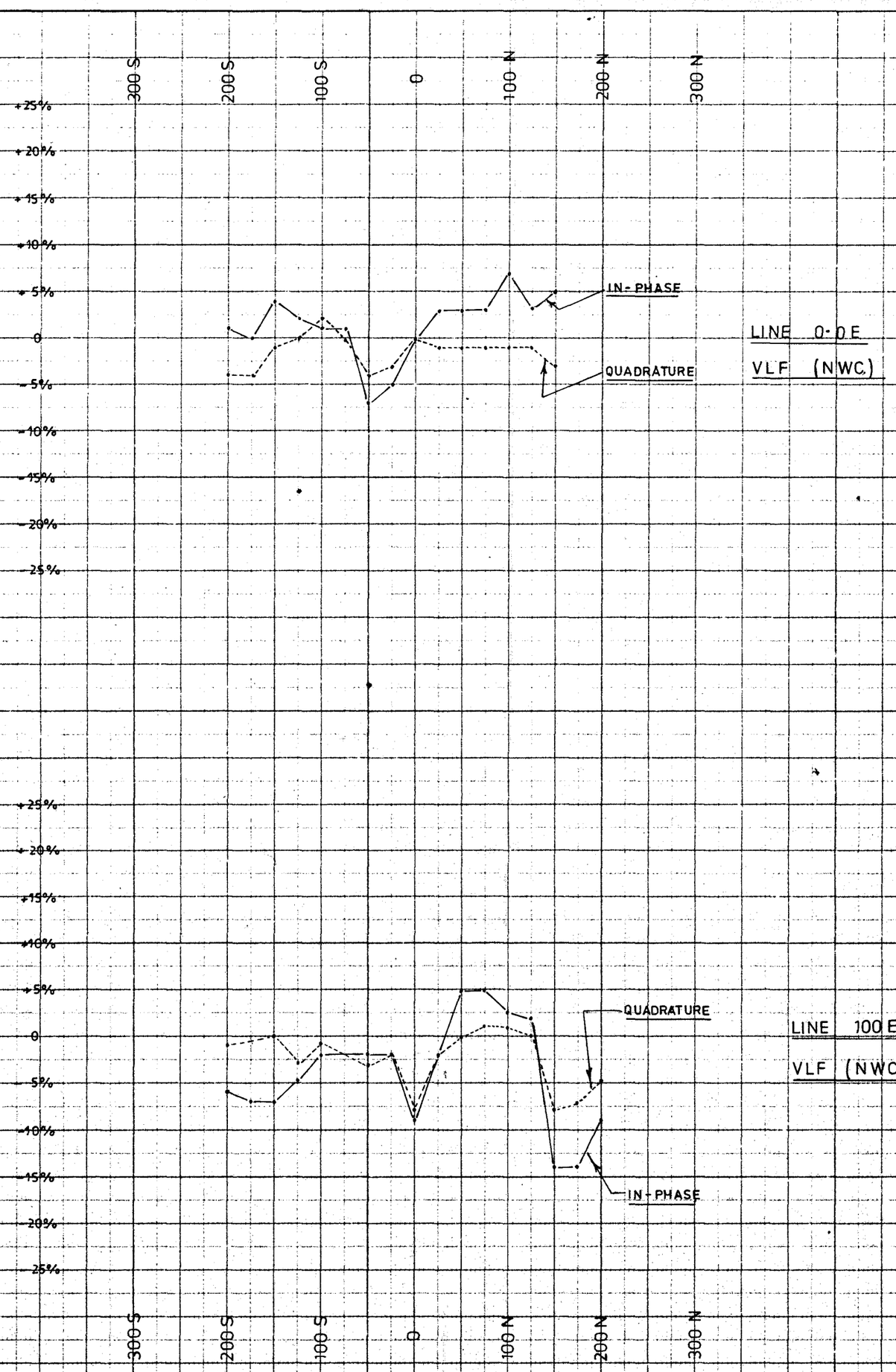
QUADRATURE

IN-PHASE

5 cm

319035

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM 16	Datum		Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S Mudge	Base Peg		Vert. Scale	1 cm to 5%	PROSPECT.	TURAIR ANOMALOUS ZONE L
Plan No. 3365 S/A 004	Scale Fact.	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics 77-1205 4

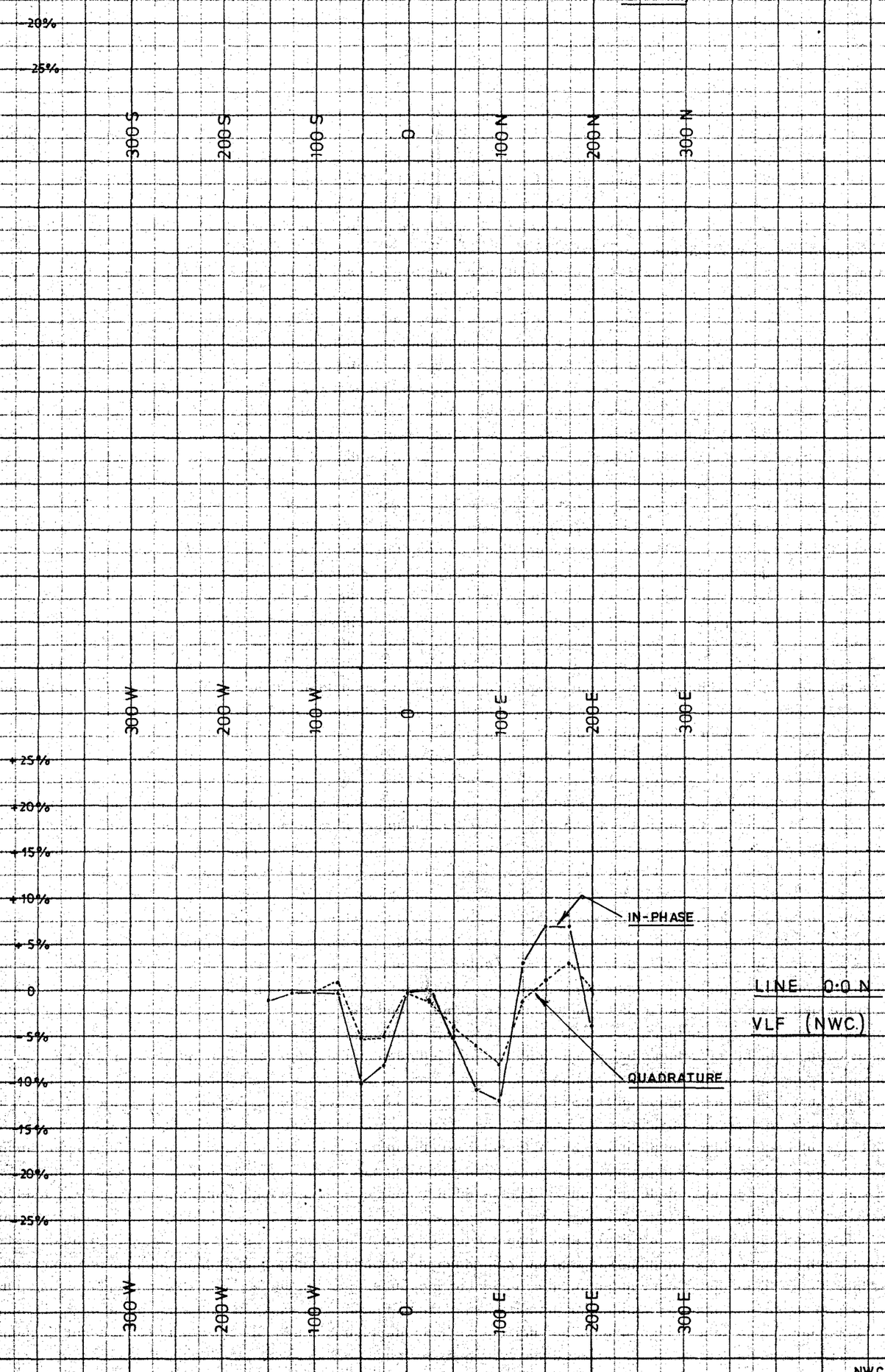


LINE 0·0 E

VLF (NWC.)

LINE 100 E

VLF (NWC)



LINE 0·0 N

VLF (NWC.)

NORTH/SOUTH SURVEY LINES
(BEARING GRID NORTH/SOUTH)

NWC

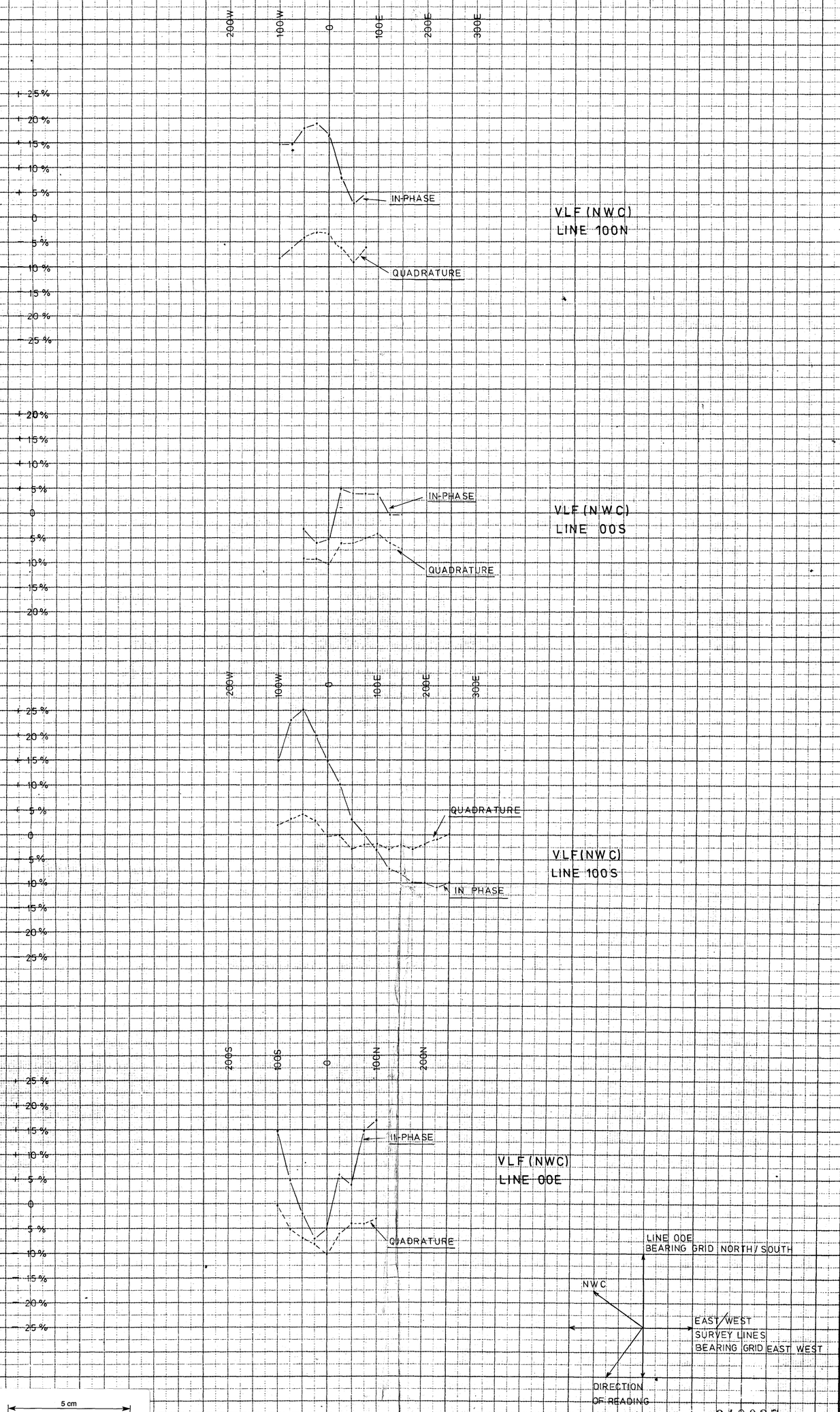
EAST/WEST SURVEY LINE
(BEARING GRID EAST/WEST)

READING DIRECTION

5 cm

319036

GEOPEKO LTD. Geophysical Surveys. Plan No. 3378 S/A 005	Instrument	Geonics EM16	Datum	—	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania.
	Observer	S. Mudge	Base Peg	—	Vert. Scale	1 cm to 5%	PROSPECT.	TURAIR ANOMALY No. 47.
	Scale Fact.	—	Date	Feb. 1977	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics. 77-1205 5



GEOPEKO LTD. Geophysical Surveys. Plan No. 3366 S/A 006	Instrument	Geonics EM 16	Datum		Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S Mudge	Base Peg		Vert. Scale	1 cm to 5%	PROSPECT.	EM ANOMALY No 1
	Scale Fact	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

319037

77-1205 6

5 cm

700S 600S 500S 400S 300S 200S 100S 0 100N 200N 300N 400N 500N 600N 700N

+25% +20% +15% +10% +5% 0 -5% -10% -15% -20% -25%

LINE 100W
VLF (NWC)
IN-PHASE
QUADRATURE

LINE 025W
VLF (NWC)
IN PHASE
QUADRATURE

LINE 00E
VLF (NWC)
IN-PHASE
QUADRATURE

LINE 025E
VLF (NWC)
IN-PHASE
QUADRATURE

LINE 100E
VLF (NWC)
IN-PHASE
QUADRATURE

DIRECTION OF READING
S
N
NWC
SURVEY LINE

EL 152N LINE INTERSECTS ALL LINES AT 0 N/S

ALL LINES PARALLEL TO E.L. GRID BASE LINE

319038

GEOPEKO LTD. 007 Geophysical Surveys. Plan No. 3373 S/A	Instrument	Geonics EM 16	Datum	—	Hor. Scale	1cm to 50m	AREA.	Birch Inlet Tasmania
	Observer	S.Mudge	Base Peg	—	Vert. Scale	1 cm to 5%	PROSPECT.	VIKING 10 (EM ANOM No 2)
	Scale Fact.	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Profile of VLF-EM 77-1205

300W 200W 100W 0 100E 200E

+ 25 %
+ 20 %
+ 15 %
+ 10 %
+ 5 %
0
- 5 %
- 10 %
- 15 %
- 20 %
- 25 %

IN-PHASE

QUADRATURE

LINE 100W
LINE 025W
LINE 00E
LINE 025E
LINE 100E

INTERSECTION OF
EM ANOM No 2 N/S LINES

VLF (NWC)
LINE 156 N

NWC
W
E
DIRECTION OF
READINGS

5 cm

GEOPEKO LTD. 008 Geophysical Surveys. Plan No. 3376 S/A	Instrument	Geonics EM 16	Datum	—	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	1 cm to 5%	PROSPECT.	VIKING 10 (EM ANOM. No 2)
	Scale Fact.	—	Date	Feb 77	Cont. Int.	—	PLAN SHOWS	Profile of VLF - EM 8

700S 600S 500S 400S 300S 200S 100S 0 100N 200N 300N 400N 500N 600N 700N

4 %
3 %
2 %
1 %
0
1 %
2 %
Chargeability

M4 M3 M2 M1

GRADIENT ARRAY IP
LINE 00E
GRADIENT = 50 metres

1000
900
800
700
600
500
400
300
200
100
0
Ohm metres

APPARENT RESISTIVITY
LINE 00E
DERIVED FROM GRADIENT ARRAY IP

700S 600S 500S 400S 300S 200S 100S 0 100N 200N 300N 400N 500N 600N

63000
nT
62000

MAGNETICS
LINE 00E

5 cm

319040

GEOPEKO LTD. 009 Geophysical Surveys.	Instrument	Huntec (IP) Geometrics 816 (Mag)	Datum	63 000nT	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	As shown	PROSPECT.	VIKING 10 (EM ANOM No 2)
Plan No. 3374 S/A	Scale Fact.		Date	Feb 77	Cont. Int.		PLAN SHOWS	Gradient Array. IP and Magnetics

9
77-1205

200W 100W 0 100E 200E 300E

149N 150N 151N 152N

+15 %
+10 %
+5 %
0
-5 %
-10 %

QUADRATURE
IN-PHASE

LINE 151·5N

63000
nT
62000

VLF (NWC)
BASE LINE

LINE 150·5N

MAGNETICS
BASE LINE

LINE 149·5N

LINE BEARING
GRID NORTH SOUTH

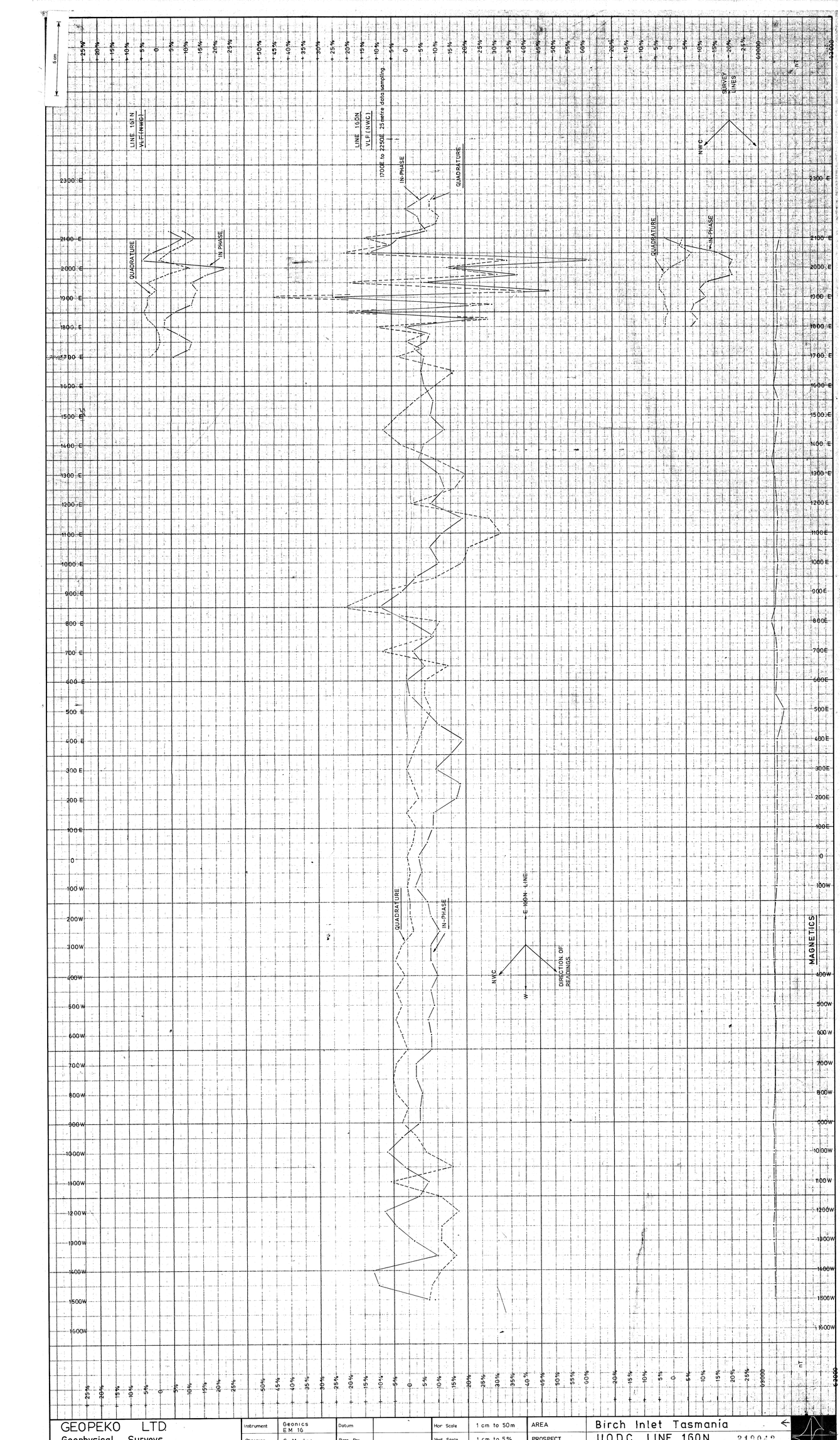
LINE 148·5N

BASE LINE
NWC
EAST/WEST
SURVEY LINES
DIRECTION OF
READING

VLF (NWC)

5 cm

GEOPEKO LTD. 010 Geophysical Surveys. Plan No. 3367 S/A	Instrument	GeonicsEM16 Geometrics 816	Datum	63000nT	Hor. Scale	1 cm to 50 m	AREA. 31904	Birch Inlet Tasmania
	Observer	S Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	EM ANOMALY No 3
	Scale Fact.	—	Date	Feb 1977	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics 77-1205 10



GEOPEKO LTD Geophysical Surveys. Plan No. 3380 S/A 011	Instrument	Geonics EM 16	Datum		Hor Scale	1 cm to 50m	AREA	Birch Inlet Tasmania
	Observer	S. Mudge	Base Pag		Vert. Scale	1 cm to 5%	PROSPECT	U.O.D.C. LINE 160N 210012
	Scale Fact.		Date	February 1977	Cont Int.		PLAN SHOWS	Reconnaissance Geophysics 77-1205 11

0 100E 200E 300E 400E 500E 600E 700E

+55%
+45%
+35%
+25%
+15%
+10%
+5%
0
-5%
-10%
-15%
-20%
-25%
-30%
-35%
-40%

63000
nT
62000

IN PHASE

QUADRATURE

Water Falls

VLF (NWC)

LINE FOLLOWS HALES RIVER

NWC
W
APPROX DIRECTION OF HALES RIVER
READING DIRECTION

MAGNETICS

0 100E 200E 300E 400E 500E 600E 700E

319043

5 cm

GEOPEKO LTD.
Geophysical Surveys.

Plan No. 3368 S/A 012

Instrument	Geonics EM16 Geometrics ~~Unimag~~	Datum	63000nT	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
Observer	S Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	EM ANOMALY No 7
Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics

77-1205 12

0 100E 200E 300E 400E

+35%
+30%
+25%
+20%
+15%
+10%
+5%
0
-5%
-10%
-15%
-20%

QUADRATURE

IN-PHASE

VLF (NWC)

LINE BEARING
78° (Mag)

63000

nT

62000

MAGNETICS

NWC

W E

SURVEY LINE
BEARING 78° (Mag)

READING
DIRECTION

0 100E 200E 300E 400E

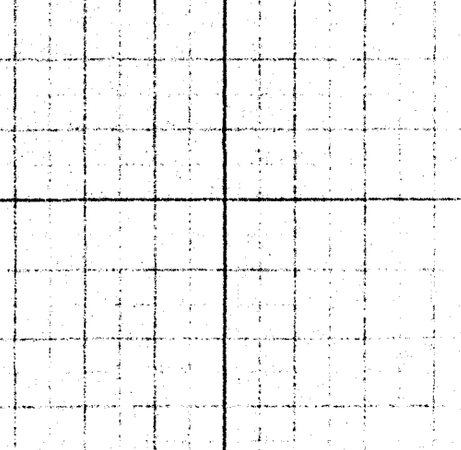
319044

5 cm

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16 Geometrics Unimag	Datum	63 000nT	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	EM ANOMALY No 8
Plan No. 3369 S/A 013	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics 77-1205 13

0 100E 200E

25%
20%
15
10
5
0
5
10
15
20



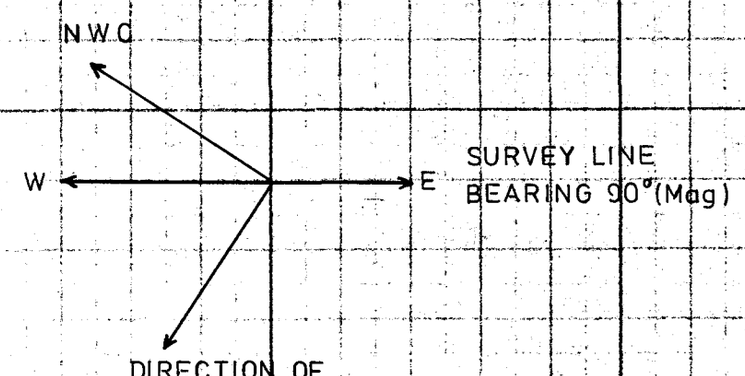
VLF (NWC)

LINE BEARING
90° (Mag)

63000

62000

MAGNETICS



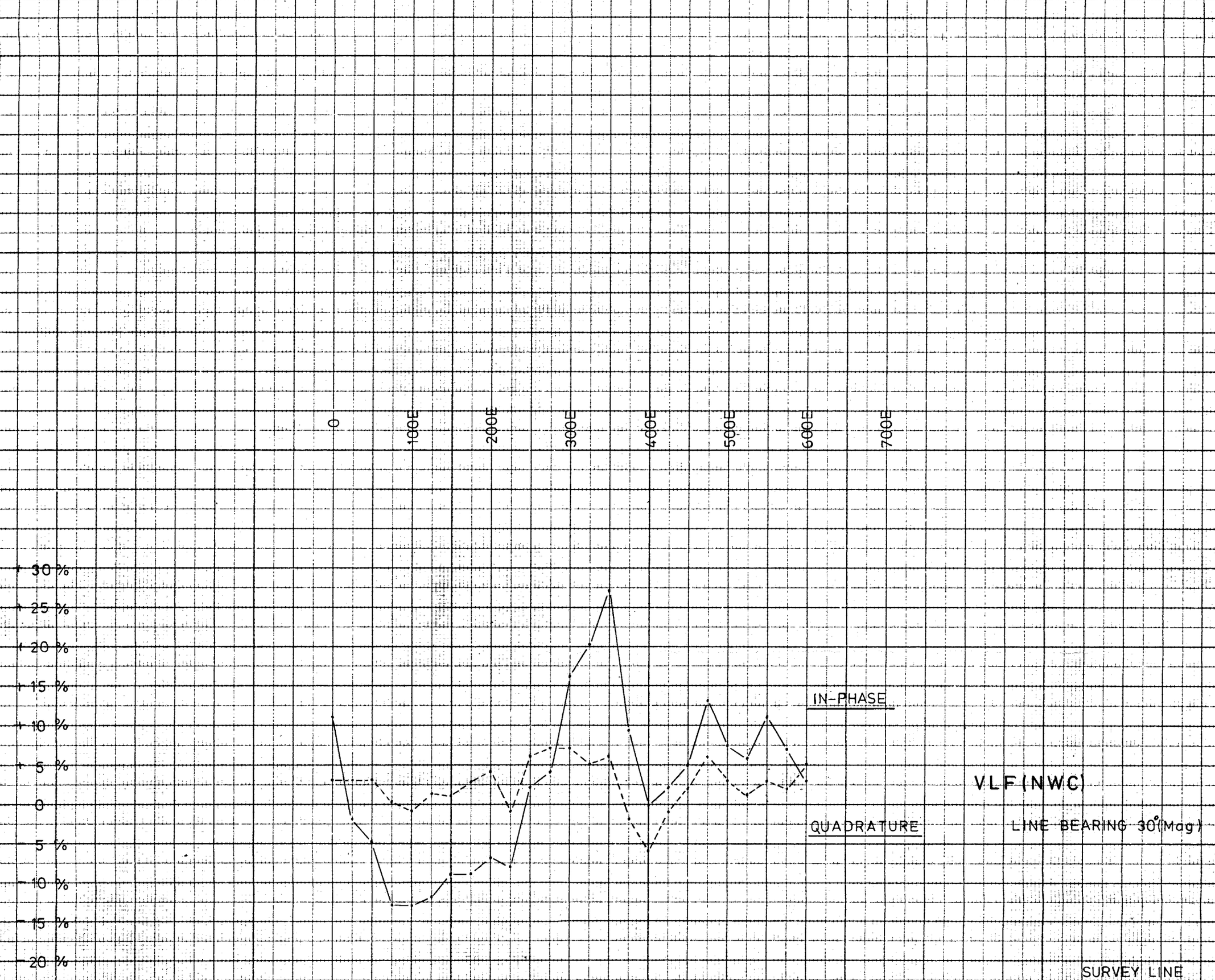
0 100E 200E

3190 45

5 cm

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16 Geometrics ~~Unimag~~	Datum	63 000n	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	as shown	PROSPECT.	EM ANOMALY No 9
Plan No. 3370 S/A 014	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics 77-1205

14



319046

GEOPEKO LTD. Geophysical Surveys.	Instrument	Geonics EM16	Datum	-	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
	Observer	S. Mudge	Base Peg		Vert. Scale	1 cm to 5%	PROSPECT.	EM ANOMALY No 10
Plan No. 3371 S/A 015	Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics 77-1205 15

200W 100W 0 100E 200E 300E 400E 500E 600E

+ 15%
+ 10%
+ 5%
0
- 5%
- 10%
- 15%

63000

nT

62000

+ 15%
+ 10%
+ 5%
0
- 5%
- 10%
- 15%
- 20%
- 25%

QUADRATURE

IN-PHASE

LINE 100N
VLF (NWC)

LINE 100N
MAGNETICS

NWC

SURVEY LINES
BEAR 90° (Mag)

DIRECTION OF
READINGS

QUADRATURE

IN-PHASE

LINE 00N
VLF (NWC)

200W 100W 0 100E 200E 300E 400E 500E 600E

319047

5 cm

GEOPEKO LTD.
Geophysical Surveys.

Plan No. 3372 S/A 016

Instrument	Geonics EM16 Geometrics ~~Unimag~~	Datum	63 000nT	Hor. Scale	1 cm to 50 m	AREA.	Birch Inlet Tasmania
Observer	S. Mudge	Base Peg	—	Vert. Scale	as shown	PROSPECT.	EM ANOMALY No 11
Scale Fact.	—	Date	March 77	Cont. Int.	—	PLAN SHOWS	Reconnaissance Geophysics 77-1205 16