

000

238001

OPEN FILE

GEOPHYSICAL PROGRESS REPORT

ON

MARINER I TASMANIA

E.L. 10/74
MICROFILMED

by

R. C. DEAKIN

September, 1977.

CONTENTS

PAGE NO.

Introduction	1
Geology and nature of the problem	2
Work done	3
Results	5
Interpretation	7
Conclusions	8
Recommendations	9

GEOPEKO LIMITED
P.O. BOX 598, DEVONPORT

Accompanying PlansPlan Number

3311	Self-Potential Profiles
3312	Self-Potential Contours
3328	Geomagnetic Total Force Profiles
3327	Geomagnetic Total Force Contours
3332	I.P. Chargeability Profiles
3330	I.P. Chargeability Contours (M1)
3334	V.L.F. E.M. Profiles
3329	Filtered V.L.F. In-phase Horizontal Gradient Contours
3337	T.E.M. Profile Line 9650E

INTRODUCTION

Mariner I is a prospect within Black Bluffs E.L. 10/74 northwest Tasmania which is being explored by Geopeko in a joint venture with Union Oil Development Corporation (U.O.D.C.).

During the 1975 field season U.O.D.C. carried out regional stream sediment sampling and I.P.-resistivity and soil geochemistry along six wide spread reconnaissance lines. Two moderate I.P. anomalies on lines C and D together with coincident soil geochemical anomalies delineated area B for more detailed exploration.

The proposed Mariner I grid covers Area B and the two I.P./geochem. anomalies. To date only the western end of the grid has been developed. This part of the grid, which is the subject of this report, covers the I.P./geochem. anomaly on U.O.D.C. line C.

003

GEOLOGY AND NATURE OF THE PROBLEM

The geology of the Mariner I area is broadly NE - SW trending acid volcanic units of the Cambrian Mt. Read Volcanic suite. These rocks are unconformably overlain by tertiary basalt and recent alluvium. At the western end of the grid the main zone of interest is the contact between Lithic Crystal Tuff and Quartz Feldspar Porphyry (Quartz Keratophyre). The edge of the Tertiary basalt cover follows this contact closely.

The prospect is in relatively flat terrain with thick vegetation in parts and "button grass" swamp in others.

The depth of weathering appears variable, being up to 12 metres or more in the swampy areas and possibly quite shallow in others. In areas of thin basalt cover relatively fresh rock exists below a thin layer (3 metres approximately) in some parts.

The peaty cover in the swampy areas appears to form a resistive layer rather than a conductive one.

The target sought at this prospect is massive base metal sulphides of the Western Tasmanian type. Several geophysical techniques were applied to locate any possible ore bodies and to serve as an orientation exercise for further geophysics in the Tasmanian environment.

004

Work DoneMagnetics

Lines 9200E to 9900E plus the base line 10000N and extensions to the west along the Hydro Electric Commission (H.E.C.) survey line were read with a Geometrics proton precession total force magnetometer. Readings were taken at 12.5 metres interval. The results are presented as profiles and contours.

Self-Potential (S.P.)

Lines 9500E to 9900E and the base line 10000N were surveyed using a reading interval of 12.5 metres. Results are presented as profiles and contours.

Induced Polarisation (I.P.)

Lines 9400E to 9900E were surveyed using a gradient array configuration with a measuring dipole of 25 metres. The results are presented as profiles of the four chargeability values and a contour plan of the M1 values.

Apparent resistivity data was not recorded because of an instrument malfunction.

V.L.F. Electromagnetics (E.M.)

A geonics E.M. 16 unit was employed to record both in-phase and quadrature values at 12.5 metres spacing, along lines 9200E, 9300E, 9400E, 9600E, 9700E, 9800E and 9900E. The V.L.F. transmitter at North West Cape was used. This means that the horizontal E.M. field from this transmitter was almost along strike at this prospect and virtually useless for coupling with along strike conductors.

The data is presented as profiles and a contour plan of the filtered horizontal gradient in-phase data.

005

Transient Electromagnetics (T.E.M.)

One line (9650E) was surveyed with 100 x 100 metre horizontal loops at 50 metre intervals. The instrument, Palmer T.E.M. Mark I system, uses an "on" time of 5 milliseconds and measures the decaying signal at ten intervals after "switch off". The results are presented as a profile on a semi logarithmic plot for each decay time.

Because of the very low signal levels, signal to noise ratio was poor. Problems were encountered with current leakage from the wires due to the damp conditions.

006

RESULTS

Magnetics

The data shows several high amplitude linear east-west (grid) anomalies. These features terminate to the east along a NW-SE line which corresponds with the major geological contact and the edge of the overlying basalt.

Although these anomalies were recorded over the basalt capping they do not appear to be caused by it. They probably reflect magnetic units within the underlying tuff unit.

The magnetic data agrees with the assumed E-W (grid) geological strike which suggests the geological contact between the tuff and porphyry units is unconformable or faulted.

Self-Potential

The S.P. data shows one significant anomaly of about 40 millivolts at 9800N on line 9000E. This has been correlated with very weak anomalies on adjoining lines.

This anomaly requires confirmation and detailing.

Induced Polarisation

Background chargeabilities in the area are very low; about 1% or less for M1. The survey has revealed two anomalies.

1. A linear anomaly extending from 9700E/10100N to 9400E/10250N. This correlates well with the tuff/porphyry contact and with a V.L.F. anomaly. This anomaly is the one revealed by the U.O.D.C. reconnaissance I.P. (line C).

2. An isolated anomaly at 9800N on line 9800E which coincides with the S.P. anomaly.

007

V.L.F. E.M.

The in-phase data has revealed several anomalies of small and moderate magnitude. Compared with available case histories from Tasmania they are good anomalies. The quadrature (out-of-phase) data is less definitive.

Because of the nature of the method and the poor strike direction relative to the transmitted field the results need to be treated with caution.

The V.L.F. in-phase results appear to form a series of NW-SE trending anomalies apparently cutting 45° across strike.

T.E.M.

The current normalised voltages, recorded are very low because of the high resistivities in this region. No significant anomalies are apparent.

The values over the swampy areas are much lower than that over the basalt indicating that the peat/swamp overburden is highly resistive.

INTERPRETATION

1. The coincident S.P. and I.P. anomaly at 9800E/9800N correlates with a zone of geochemical anomalies (Cu - 300 ppm, Zn - 1000 ppm -, Pb - 5000 ppm).

At this stage this locality requires testing. Prior to this more detailed geophysics should be carried out.

2. The linear NW-SE E.M. anomalies appear to be real and may be the response of cross cutting shears or faults. The tuff/porphyry contact may in fact be a fault below one of the E.M. anomalies. The magnetic data in some instances terminates or is displaced at the interpreted position of these E.M. anomalies.

The linear I.P. anomaly in the northern part of the prospect surveyed coincides with a linear E.M. anomaly and may indicate associated disseminated sulphides. Geochemical results, however, offer little encouragement in this zone.

3. Quantitative interpretation of the magnetic data is not justified because of the mutual interference from adjacent anomalies and the disjointed anomaly pattern.

A qualitative assessment of the data suggests the dips of the magnetic bodies are variable indicating complex geological structure. Steep dips appear to predominate.

009

CONCLUSIONS

1. The geophysical surveys to date have revealed one area of coincident S.P., I.P. and geochemical anomalies which is probably worth testing.

2. As an orientation study for Tasmanian exploration the geophysical surveys have been useful:

- a) The results indicate that S.P. and I.P. are probably the best focussing tools in this environment.
- b) Magnetics can be a useful method, at least indirectly and should continue to be used.
- c) The success of electromagnetic techniques is doubtful. Even very poor conductors within the prevailing high resistivity country rocks and overburden provide ideal E.M. targets.
- d) The V.L.F. method is further restricted in its application by strike direction relative to the North West Cape transmitter and by the lack of discrimination inherent in the use of a fixed distant transmitter. However, in some situations it still remains an economic reconnaissance technique.
- e) Electromagnetics may be more useful if a focusing technique with a separate portable transmitter and receiver were employed.
- f) The I.E.M. technique appears to have suffered from very low signals because of the high resistivities and poor coupling orientation for assumed steeply dipping conductors.

010

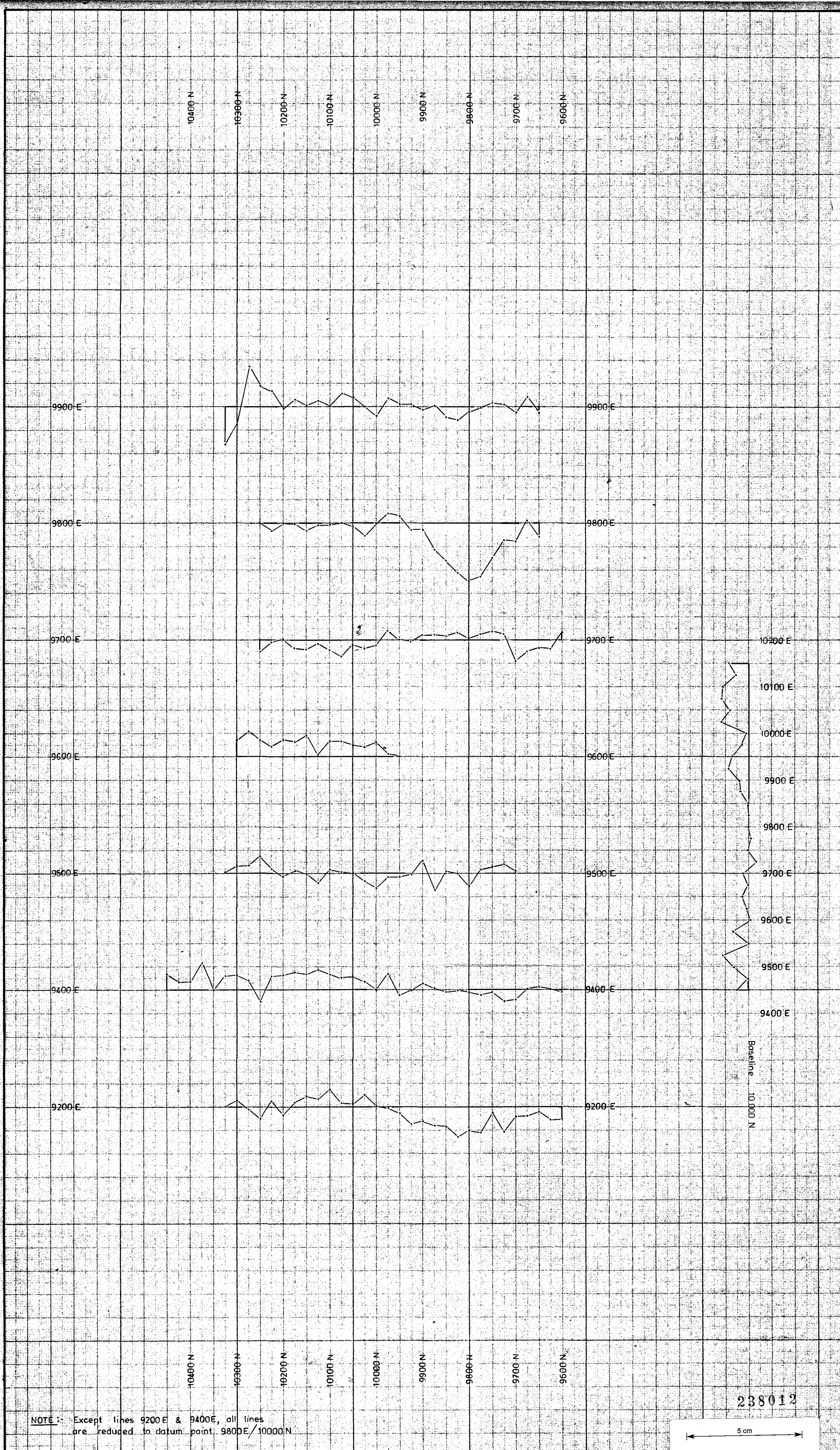
RECOMMENDATIONS

a) The coincident S.P., I.P., geochemical anomaly requires further work.

In summary:-

1. Detailed dipole-dipole I.P. along lines 50 metres apart in the area of the anomaly.
2. Confirmation of the S.P. anomaly and detailed work along lines 50 metres apart.

b) Grid extensions to the east need to be covered with magnetics, S.P. and I.P.

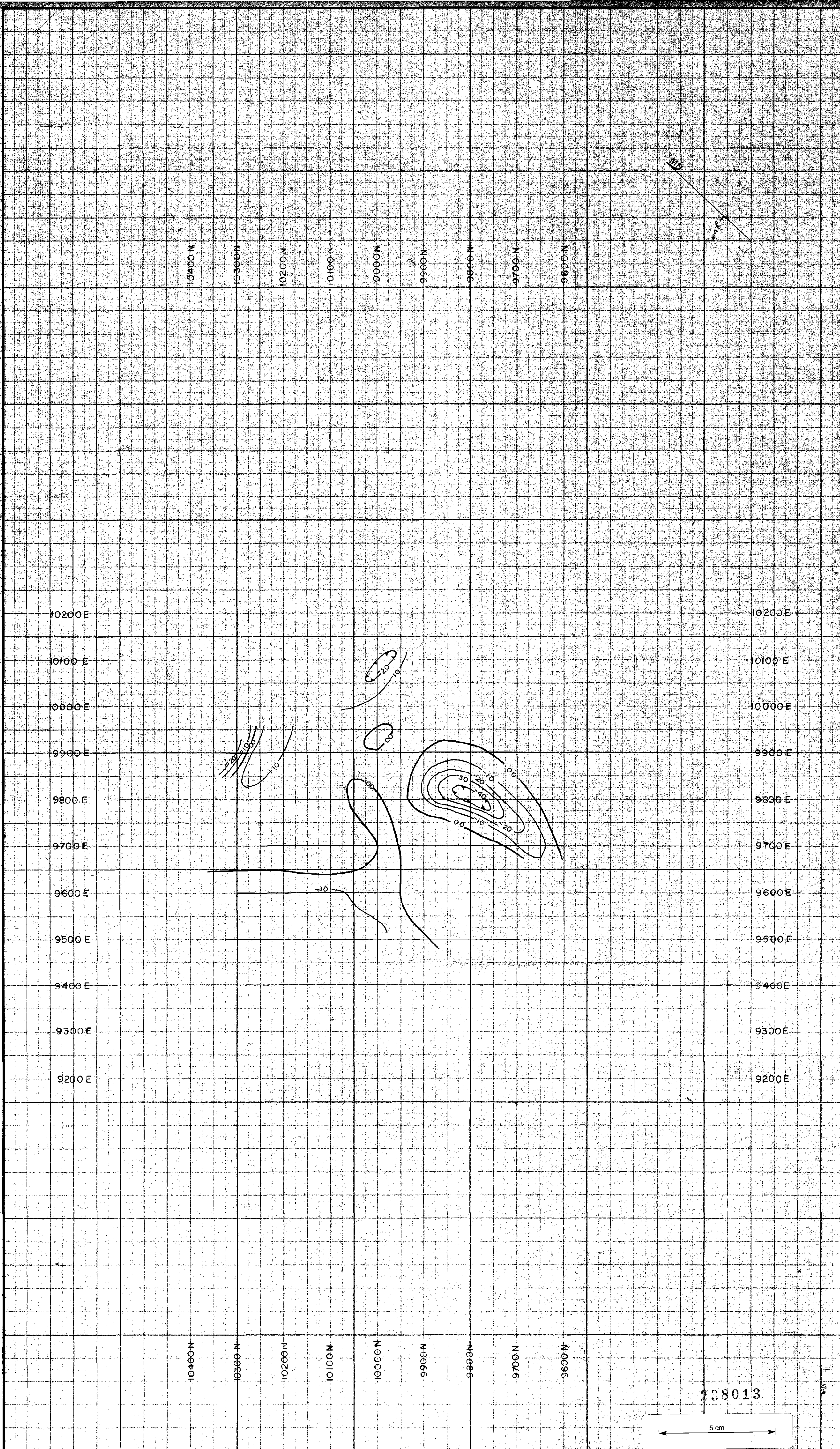


NOTE :- Except lines 9200 E & 9400 E, all lines are reduced to datum point 9800 E / 10000 N.

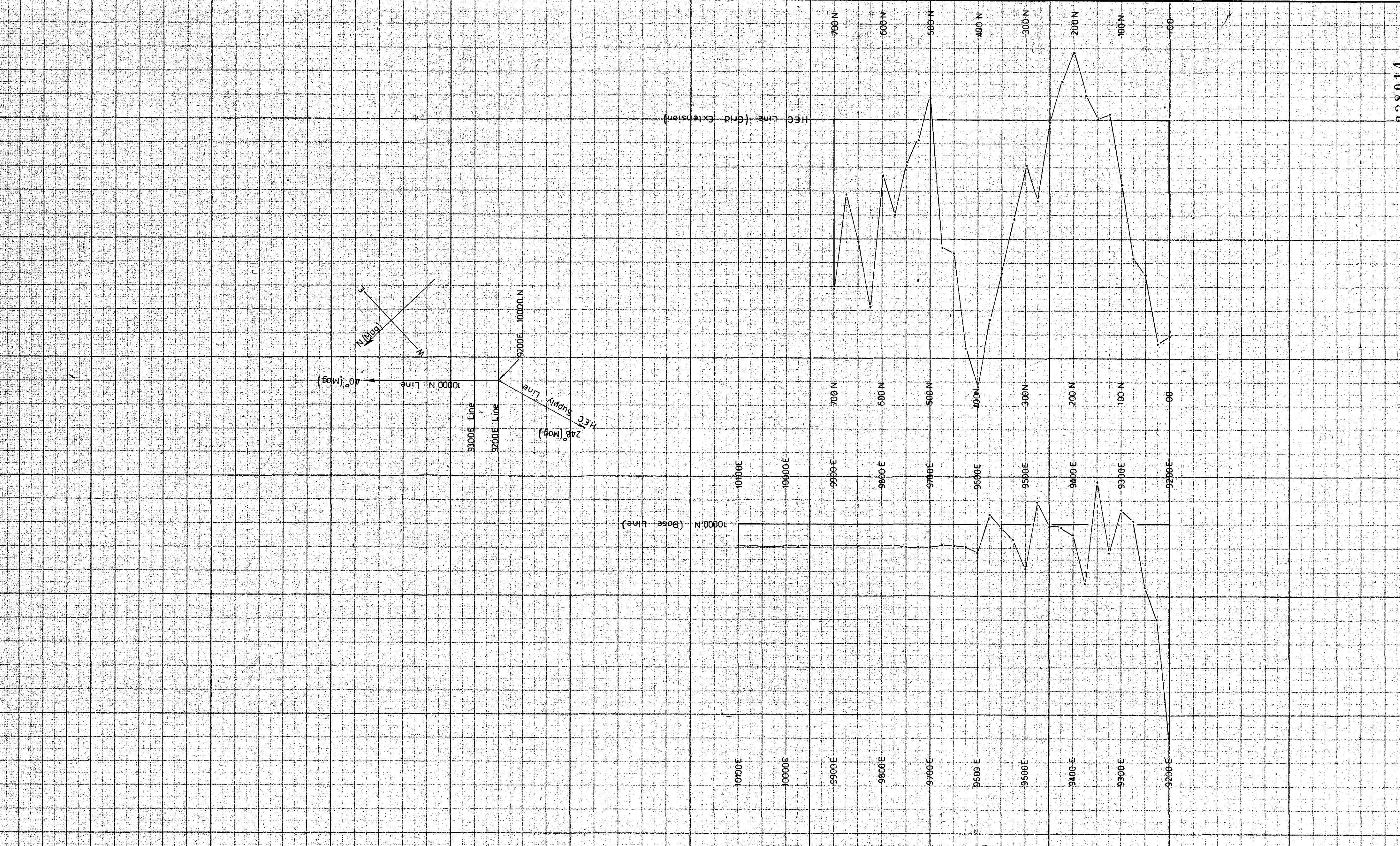
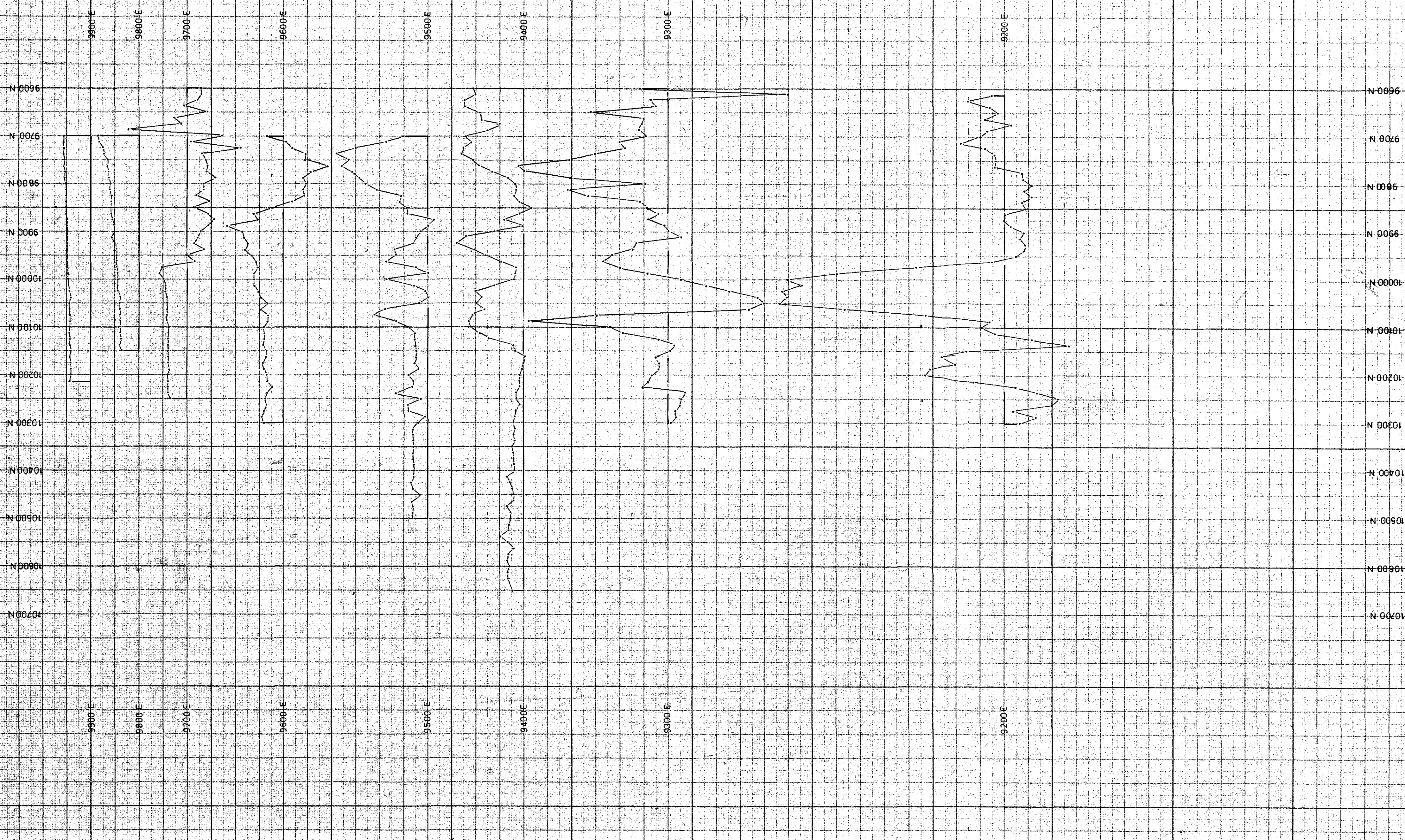
238012

5 cm

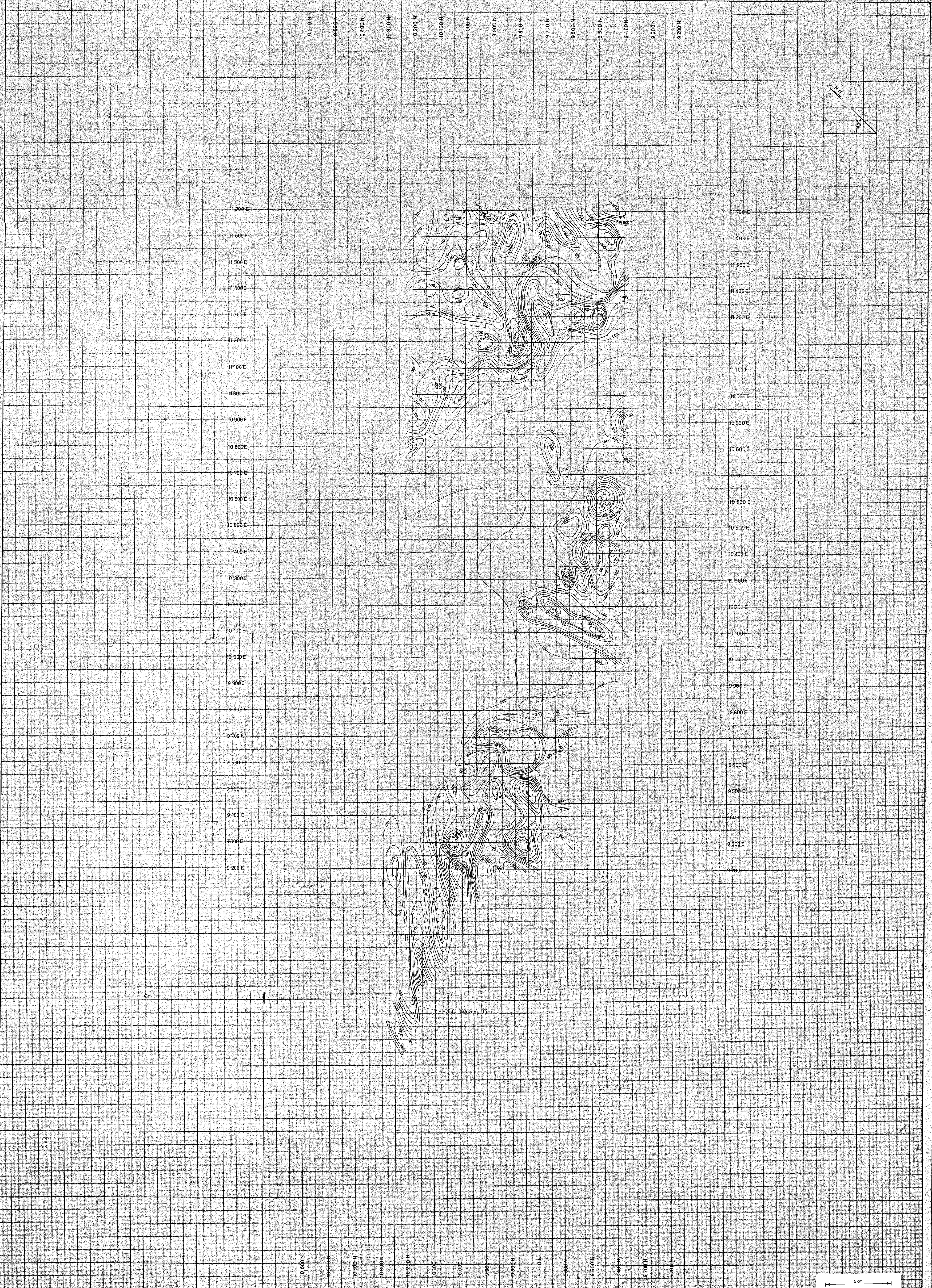
GEOPEKO LTD. Geophysical Surveys. Plan No 3311 78-1288	Instrument	Palmer	Datum	0 mV	Hor. Scale	1 cm = 50 m	AREA.	Black Bluffs EL10/74
	Observer	S Mudge	Base Peg	9800 E 10000 N	Vert. Scale	1 cm = 20 mV	PROSPECT.	MARINER 1. 3311
	Scale Fact.	—	Date	Jan. 1977	Cont. Int.	—	PLAN SHOWS	Self Potential Profiles. 1850



GEOPEKO LTD. <i>78-1288</i> Geophysical Surveys. Plan No 3312	Instrument	Palmer	Datum	0.0 mV	Hor. Scale	1 cm = 50 metres	AREA.	Black Bluffs EL10/74
	Observer	S. Mudge	Base Peg	~~9800 E~~ 10000 N	Vert. Scale	—	PROSPECT.	MARINER I.
	Scale Fact.	—	Date	Jan. 1977	Cont. Int.	10 mV.	PLAN SHOWS	Self Potential Contours. 3312 1851

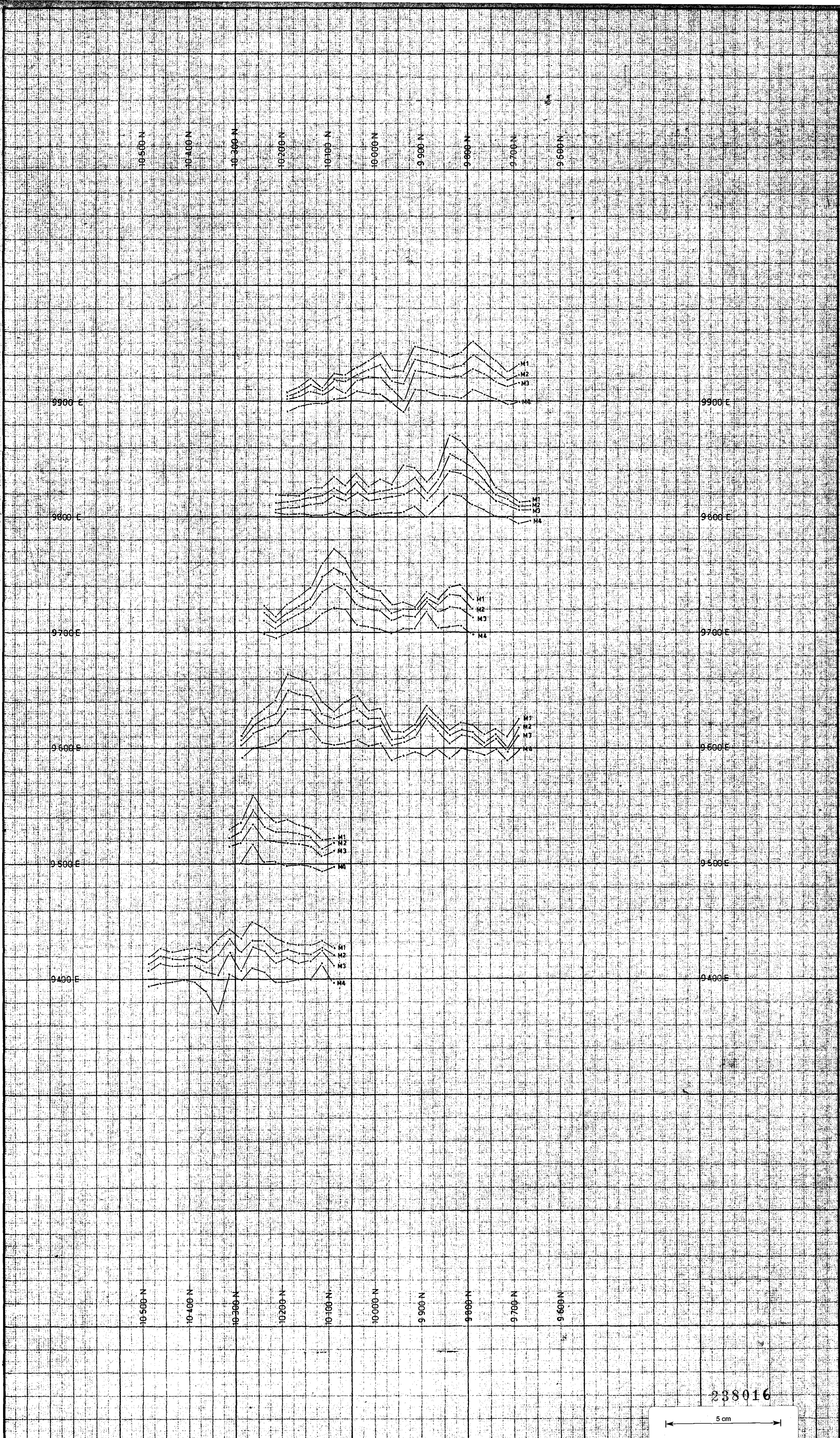


Instrument	Geometrics 816	Datum	62000 n.T.	Hor. Scale	1 cm = 50m	AREA.	Black Bluffs EL 10/74.
Observer	S. Mudge	Base Peg	9800 E / 10000 N	Vert. Scale	1 cm = 400 n.T.	PROSPECT	MARINER 1.
Scale Fact.		Date	January 1977	Cont. Int.		PLAN SHOWS	Geomagnetic Total Force Profiles.



GEOPEKO LTD.
Geophysical Surveys.
Plan No. 3327

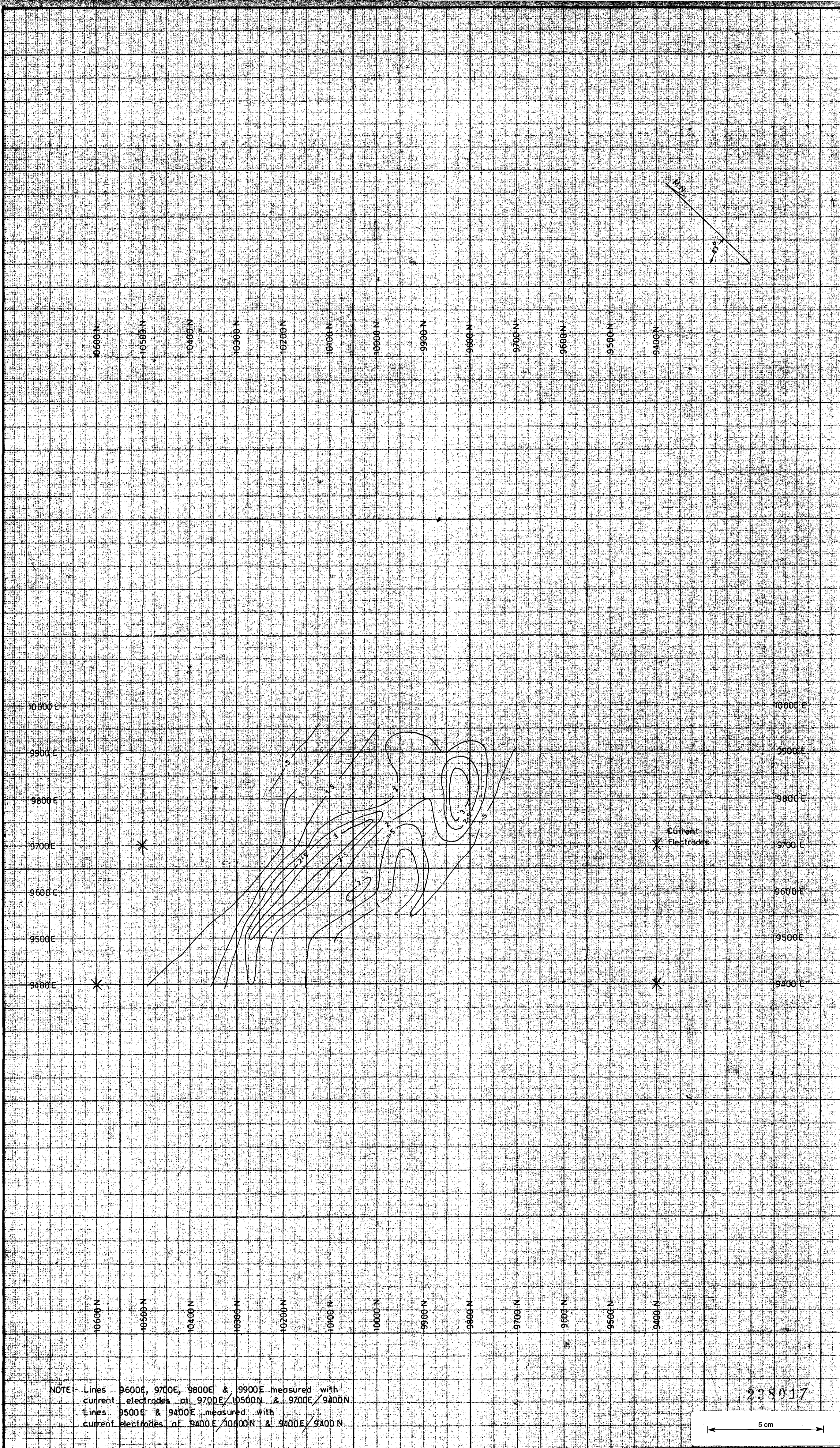
Instrument	Geometrics 815	Datum	62 000 nT	Hor. Scale	1 cm = 50 metres	AREA	Black Bluff EL 10/74 78-1288
Observer	S. Mudge & I. Ogilvie	Base Mag.	9 800 E / 10 000 N	Vert. Scale		PROSPECT.	MARINER 1. 238015
Scale Fact.		Date	December 1977	Cont. Int.	100 nT & 400 nT	PLAN SHOWS.	Geomagnetic Total Force Contours. 3327



238016

5 cm

GEOPEKO LTD. Geophysical Surveys. Plan No 3332	Instrument S. Mudge	Datum Base Peg	9800 E 10000 N	Hor. Scale 1 cm = 50 m	AREA. PROSPECT.	Black Bluffs EL10/74 MARINER 1. 78-1288
	Scale Fact.	Date	Jan. 1977	Cont. Int.	PLAN SHOWS	Gradient Array I.P. Profiles. 3332 1854
	Instrument Huntet Palmer	Datum Base Peg	9800 E 10000 N	Hor. Scale 1 cm = 50 m	AREA. PROSPECT.	Black Bluffs EL10/74 MARINER 1. 78-1288

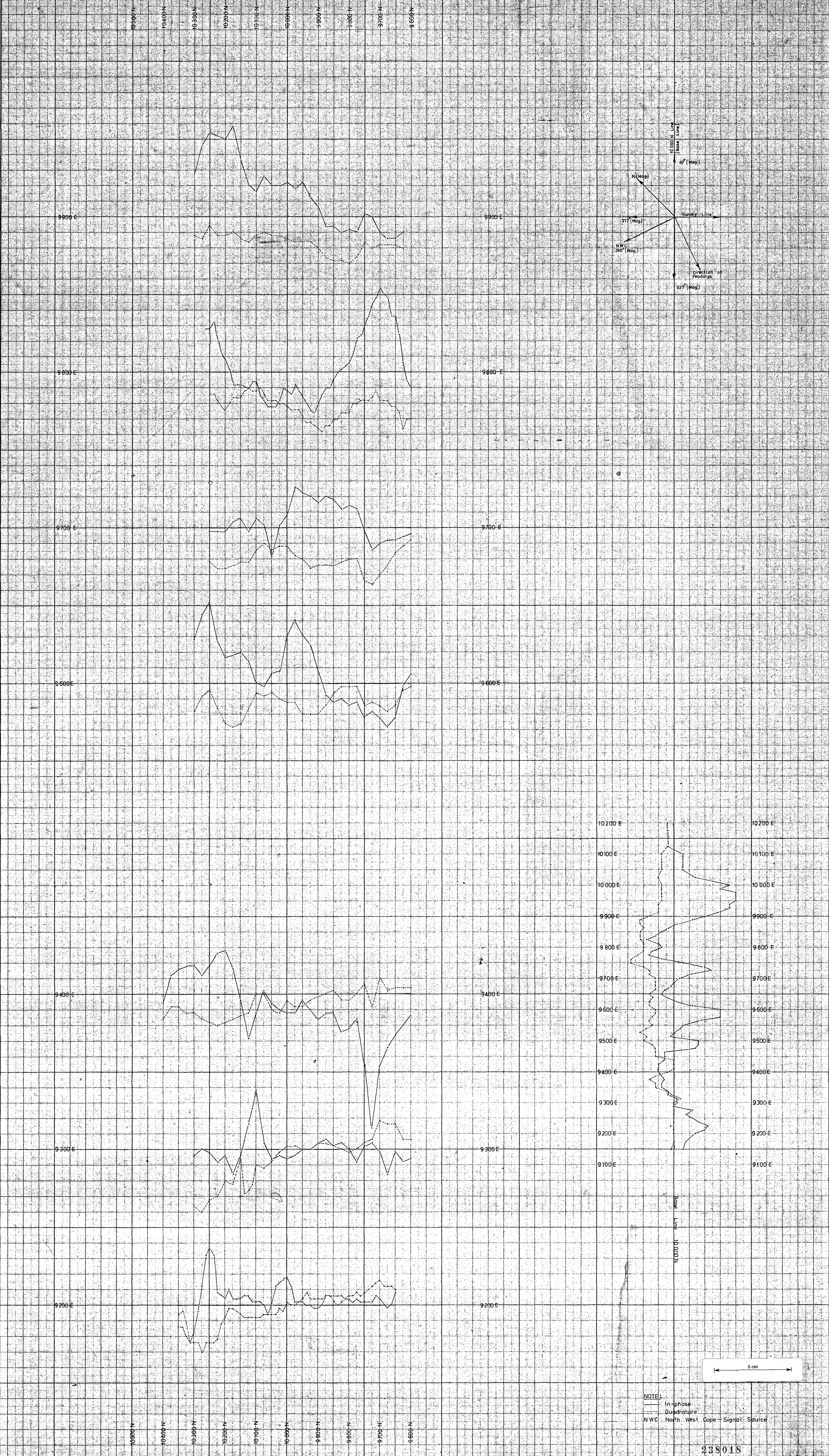


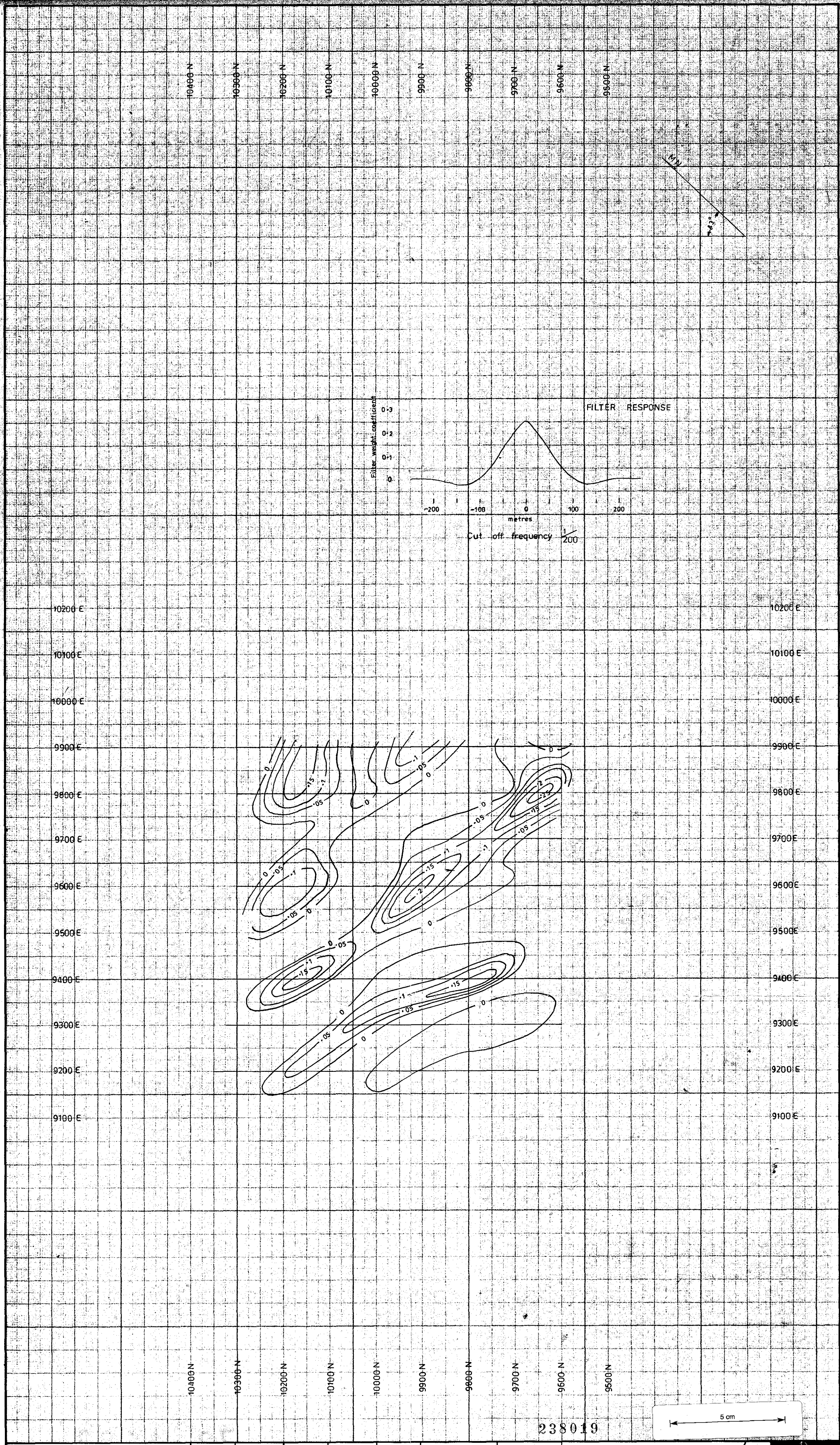
NOTE: Lines 9600E, 9700E, 9800E & 9900E measured with current electrodes at 9700E/10500N & 9700E/9400N.
Lines 9500E & 9400E measured with current electrodes at 9400E/10600N & 9400E/9400N.

238017

5 cm

GEOPEKO LTD. Geophysical Surveys. Plan No 3330	Instrument	Huntec Palmer	Datum	—	Hor. Scale	1 cm = 50 metres	AREA.	Black Bluffs EL10/74
	Observer	S Mudge	Base Peg	9800 E 10000 N	Vert. Scale	—	PROSPECT.	MARINER 1. 78-1287
	Scale Fact.	—	Date	Jan. 1977	Cont. Int.	0.5 %	PLAN SHOWS	I.P. Contours of Chargeability M1.3330
								1855

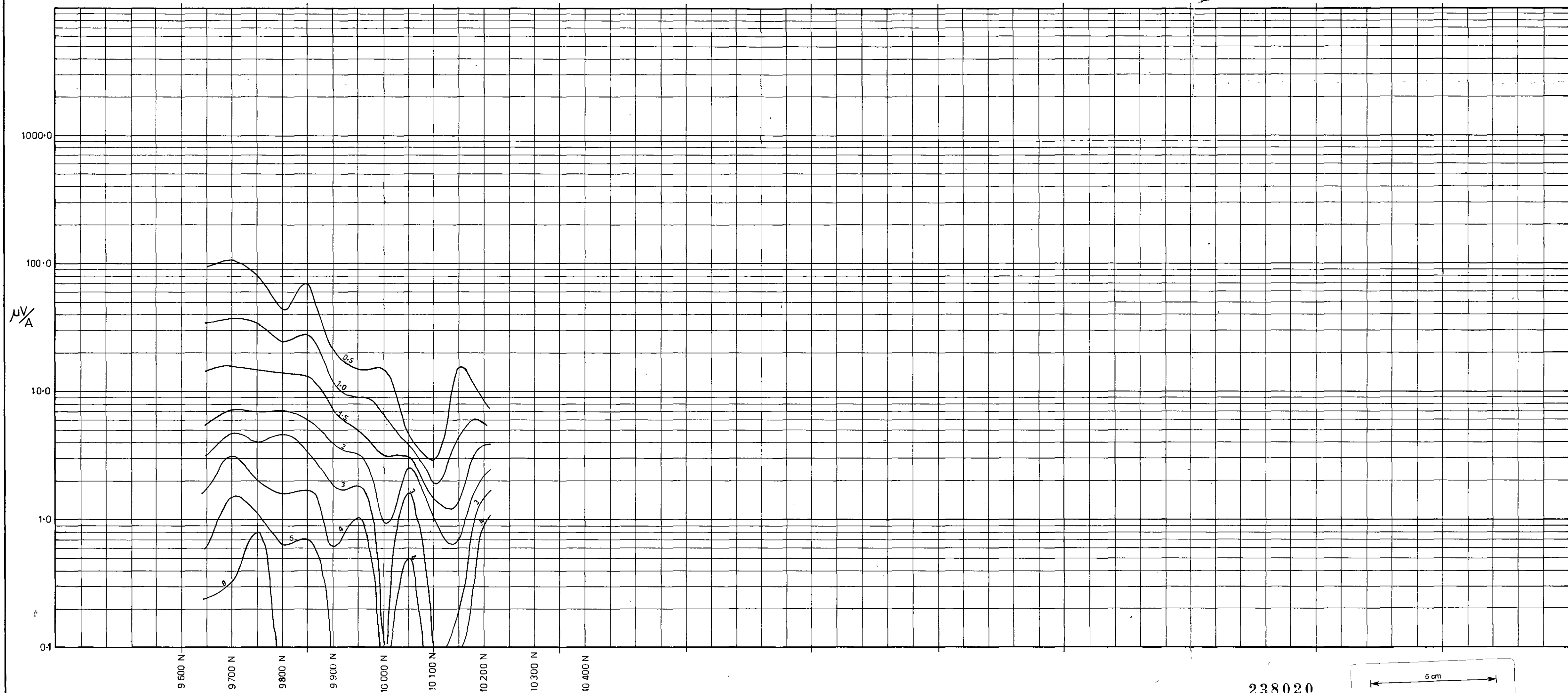




GEOPEKO LTD.
Geophysical Surveys.
Plan No 3329

Instrument	Geonics EM 16	Datum	—	Hor. Scale	1 cm = 50 m.
Observer	S. Mudge	Base Peg	9800E 10000 N	Vert. Scale	—
Scale Fact.	—	Date	March 1977	Cont. Int.	·05% / metre.

AREA.	Black Bluffs EL 10/74
PROSPECT.	MARINER 1. 3329
PLAN SHOWS	Filtered Inphase Horizontal Gradient Contours.



GEOPEKO LTD.
Geophysical Surveys.
Plan No. 3337

Instrument	Palmer	Datum	—	Hor. Scale	1cm to 50 metres	AREA	Black Bluffs EL10/74 Tasmania
Observer	R. Deakin S. Mudge	Base Peg	—	Vert. Scale	Logarithmic as shown.	PROSPECT	MARINER 1. 78-1288
Scale Fact	—	Date	Jan 1977	Loop Size	100 m.	PLAN SHOWS	T.E.M. Profile Line 9650 E. 3337 1857