Bergvesenet

Postboks 3021, 7002 Trondheim

Rapportarkivet

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BV 507			Trondheim	**Åpen**
Kommer fra ..arkiv	**Ekstern rapport nr**	**Oversendt fra**	**Fortrolig pga**	**Fortrolig fra dato:**
Falconbridge	Sul 406-76-17	Sulfidmalm A/S		

Tittel

Ground surveys and prospect - drilling at Havggajavrre 1976, Masi.

Forfatter	Dato	Bedrift
E Kreivi, K Taipale	1976	Sulfidmalm A/S

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Kautokeino	Finnmark	Finnmark	18331	Nordreisa

Fagområde	Dokument type	Forekomster
Boring Geologi Geofysikk	Rapport	Havggajavrre
Råstofftype	**Emneord**	
Malm/metall	Cu Ni Co Zn Ag	

Sammendrag

Undersøkelsen var basert på helikopter EM-anomalier sammen med moreneprøver med Zn verdier på opp til 6700ppm Zn.

Tre borhull ble boret på tilsammen 120m. Kjernene viste sure vulkanske bergartslag i basiske vulkanitter med grafittrike partier med et sulfidinnhold på 10-20%. Sulfidene besto vesentlig av pyritt med spor av sinkblende. Sulfidene opptrådde både som impregnasjon og mere massiv vev.
De høyeste analysetalleene var 1m med 0,75% Zn. Cu verdienene var lavere enn 0,05%, Ni var lavere enn 0,21% og Pb lavere enn 0,10%.

Videre arbeid ble ikke anbefalt.

A/S SULFIDMALM

INTER-OFFICE MEMORANDUM

Date: 25th April, 1977

To: Falconbridge Nikkelverk A/S

cc: W. D. Harrison, H. T. Berry, R. Jahnsen, R. B. Band, E. Kreivi

From: J. B. Gammon

Subject:

Report No. 406/76/17. Havggajavrre, Masi.

Please find attached our summary of work carried out on the Havggajavrre Grid in the Masi area. Our attention was drawn to the area by helicopter-EM anomalies in association with till-geochemistry. The limited drilling carried out indicates mineralization assaying 0.75% Zn to be present which would explain the anomalous till values of up to 6700 ppm which were obtained. No further work is recommended.

J. B. Gammon

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ASS. DIR.			EL. LYSEAVD.		
ADM. SJEF			M. L. AVD.		
SMPN. AVD.			R. & SM. AVD.		
INNKJ. AVD.			EL. TEKN. AVD.		
TEKNISK AVD.			INSTR. AVD.		
PERSONALDIR.			MEK. AVD.		
FORSKN. DIR.			PROSJ. AVD.		
3					Svar dato

FOR FALCONBRIDGE NIKKELVERK A/S
A/S SULFIDMALM

Project 905-17

Ground surveys and prospect-drilling at Havggajavrre 1976, Masi

By

E. Kreivi

K. Taipale

Report No. 406/76/17

INTRODUCTION (Fig.1)

Havggajavrre-grid is situated on Carajavrre mapsheet (1833I) about 6 km west of the intersection of the old Kautokeino-Alta-highway and the Masi-road on Stuoroaivve, and by a tractor-road to Sodnajavrre. The 3.5 km long and 800-1000 m wide grid was laid out in a N55^{o}E direction starting from the northern-most end of the lake Havggajavrre. Its purpose was to locate HEM- and reconnaissance till-sampling-anomalies. The grid-area was prospected and mapped in detail, a VLF-EM- and Mag-survey was done on all the profiles with 100 m line-spacing, a Shoot-back-EM-survey was done across the VLF-EM-anomaly-zones and three prospecting drill-holes, totalling 120 m in length, were drilled to find a source of Shoot-back - EM and geochemical anomalies.

GEOLOGY by Kalle Taipale (Fig.2)

1. General description

A several kilometers long, 300-400 m broad and 20-30 m high drumlin, cut by proglacial maltwater channels covers about one third of the grid area. Another third is covered with swamps and small ponds. The rest of the area consists of hillslopes with a little better exposure. In all the outcrop relations are not the best possible for a detailed geological study.

2. Petrography

Most of the area examined consists of mica rich schists. These schists seem to contain always more or less material of volcanic origin in the form of amphibole rich intercalations.

../2

Above the mica schist there are basic volcanics and amphibolites.

Sulphide bearing horizons are connected with the contact zone of mica schists and volcanic series.

2.1. Mica schist

Mica schist is exposed along a steep slope north of lake Havggajavrre. It consists of dark mica, quartz and some feldspar. Pyrite occurs occasionally as thin bands (~1 mm) and disseminated, too. Quartz-carbonate veins, sometimes boudinated to lenses, conform with the bedding. Pyrite is often connected with these quartz-carbonate rich parts.

Contact with the greenschist is not sharp, but rather a gradual change with increasing amount of chlorite and decreasing amounts of mica and quartz.

2.2. Greenschist

Greenschist consists mainly of chlorite and amphibole and contains variable amounts of plagioclase. It can even change to amphibolite with increasing plagioclase.

2.3. Amphibolite

This rock type consists of greenish to black amphibole and plagioclase. In places plagioclase veins and lenses can be seen. The degree of metamorphism seems to have been quite high in this area.

2.4. Chert and graphite schist

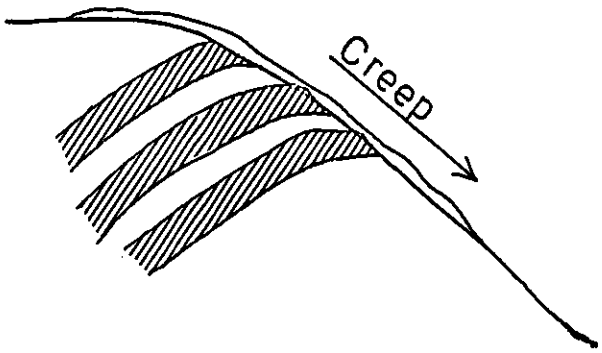
These rocks form the EM-conductive zones. On the Havggajavrre area thick gossan covers most of these rock types. In the only outcrops, the rock consists of quartz (grain size 0.5 - 1.0 mm) and some graphite with no sulphides.

3. Structure

The most dominating tectonic feature of the area is a gentle flexural fold with the axis plunging 5-10° northwards. Minor folding occurs in the less competent rock types like mica schist and chlorite rich greenschists. The axes of minor folds seem to be parallel to the regional fold axis. Also another minor fold axis has been registered on this area. It plunges 15 to 20° westwards. This might be an evidence of another folding phase, younger than folding with N-S-axis.

Faulting and fracturing seem to have taken place along NW-side of lake Havggajavrre. The bid valley in which the grid is situated might as well be a big fracture zone. Two main joint directions occur in the region, one striking E-W and another about N60W, both dipping almost vertically. In some places the E-W-striking jointing is very dense resemling fracture cleavage and could represent the axial plane cleavage of folding with E-W-axial plane.

Bedding seems to strike E-W- to N45W and dips 10 to 30°N. The difference in dip between observed and geophysically measured values is possibly caused by soil creep which has caused bending of the beds at the steep hill slope, like the drawing shows:-



4. Block searching and till geochemistry

Block searching on this area was not very succesful. Only a couple of blocks with some disseminated sulphides were found. The reason for the poor success in block searching was first the swampy landscape and thick drumlin and second the situation of the grid. The grid is almost straight across the ice flow direction and so the boulders should have been searched further to the north (see the geological map of Havggajavrre).

The biggest geochemical anomalies, along profile line 400N, have been caused by down hill flowing waters, which came over sulphide bearing horizons.

The zone of anomalous zinc values reaching from point 100N, 100W to the end of profile 700N with almost N-S-strike is situated on the upper part of a hill slope, where the overburden is very thin, (only a few decimetres). Most of these anomalous zinc values have come from the stream sediment samples, as well as most of the anomalous copper and nickel values. So it looks like the down-hill flowing waters should have enriched Zn, Cu and Ni and caused the anomalous values. The stream from which most of these anomalous samples have been taken flows across a very large gossan.

GEOPHYSICS (Fig.3)

A 400 m wide zone of VLF-EM-anomalies crosses the whole grid from the 0-profile until the 3500N-profile. Of these we can pick up 5 different horizons by Shoot-Back-EM with 50 ms coil-separation. Shoot-back-anomalies are strong, but difficult to interprete, because the conductive zones are so near each other. Mag-anomalies are very weak, up to 2200 gammas above the back-ground at 1000N/500W. The Mag-anomalies are conformable to the EM-anomalies.

GEOCHEMISTRY (Fig.4)

Till-samples were collected from the C-layer from a depth of 50 - 60 cms using a hand auger. The sample-interval was 25 m. Also stream sediment samples were collected. Atom Energy Laboratory assayed the samples for Ni, Cu, Co, Zn and Ag. A distinctive 900 m long and 400 m wide anomalous area was picked up between the profiles 0 and 900N on EM-conductors and near the contacts of volcanics with mica schists, in the area, where large gossan-areas were found. The highest values of assays were for:

Ni	1030 ppm	at	400N/350W
Cu	1240 ppm	at	700N/675W
Co	210 ppm	at	400N/275W
Zn	6700 ppm	at	600N/600W
Ag	4 ppm	at	100N/200W

DRILLING (Fig.5)

To find the source of the Shoot-Back-EM- and geochemical anomalies a contractor, called Terranor A/S, was used to drill three prospect holes, totalling 120 m:

1-H / 1776	60°/SE	30.30 m	at	700N/770W
2-H / 1776	60°/SE	39.60 m	at	600N/765W
3-H / 1776	60°/SE	50.15 m	at	400N/650W
		120.05 m		

In the core we found acid volcanics beds in basic volcanics with graphite-rich parts, which contained 10-20% sulphides, mainly pyrite with traces of sphalerite. The sulphides are impregnating as well as brecciating the rock.

The highest assay for Zn was 0.75%/1m in the hole 2-H/1776 at 20-21 m. Cu-values are less than 0.05% and Ni less than 0.21% and Pb less than 0.10%.

CONCLUSIONS

The holes were collared based on geological observations and the holes should have reached the horizons under the geochemical and EM-anomalies. According to the low assay-values of the core (max. 0.75% Zn) and compareing them with the high values in till (max. 6700 ppm Zn) one can assume that the holes did not reach the source-horizons. As mentioned by Taipale the observed dip values might be lower on the weathered surface than in solid rock because of soil creep at the steep hill-slope.

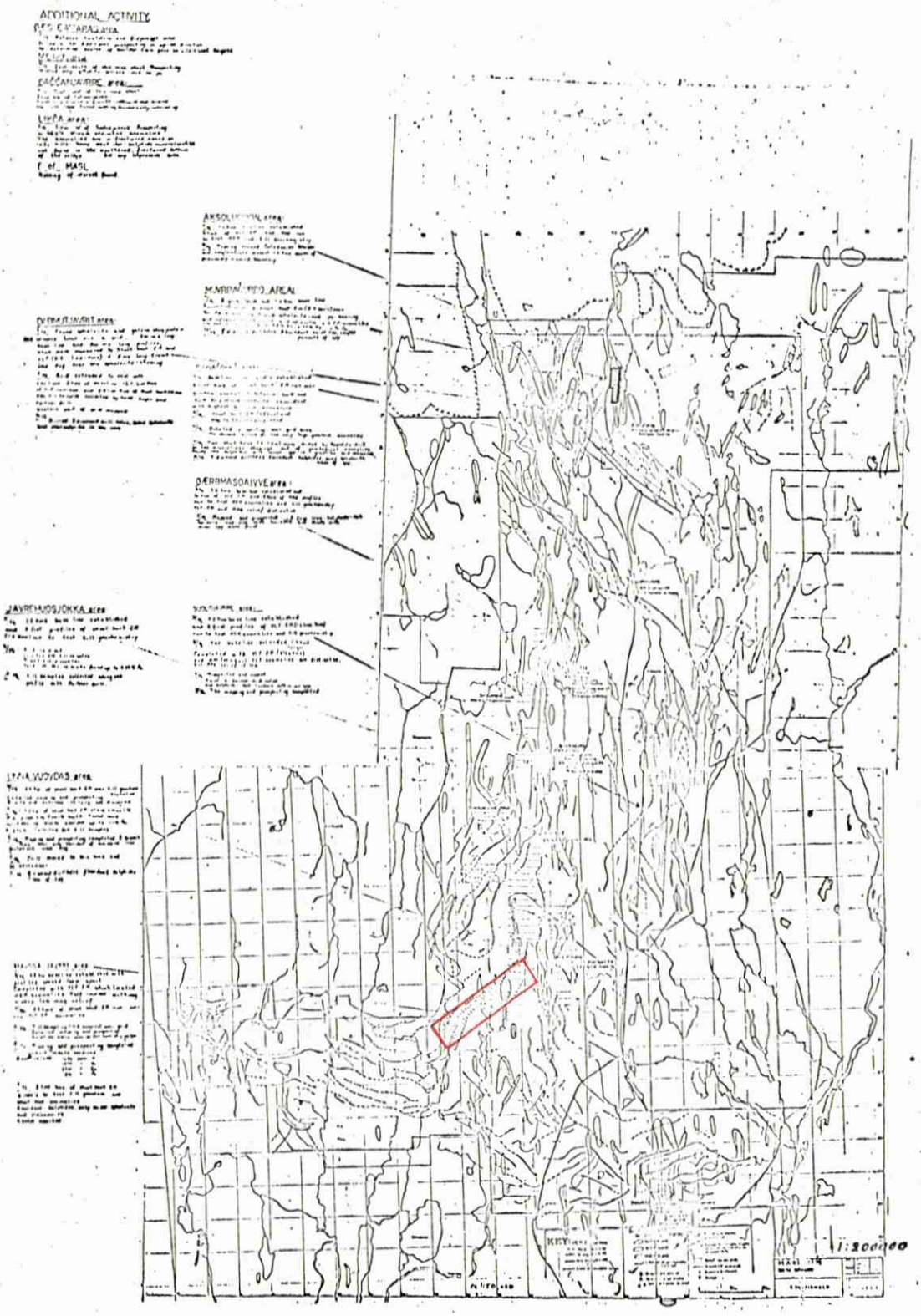
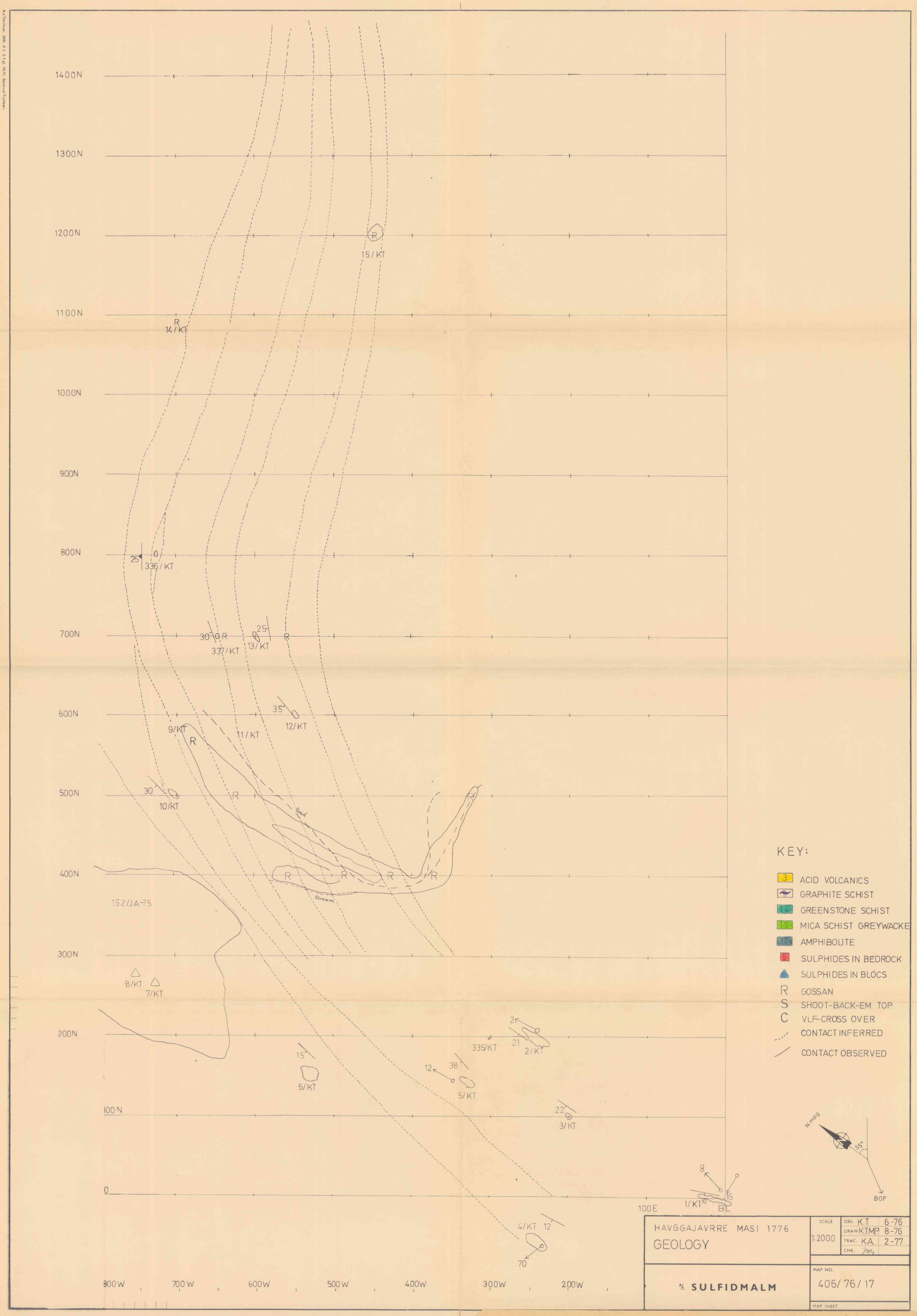


FIG. 1

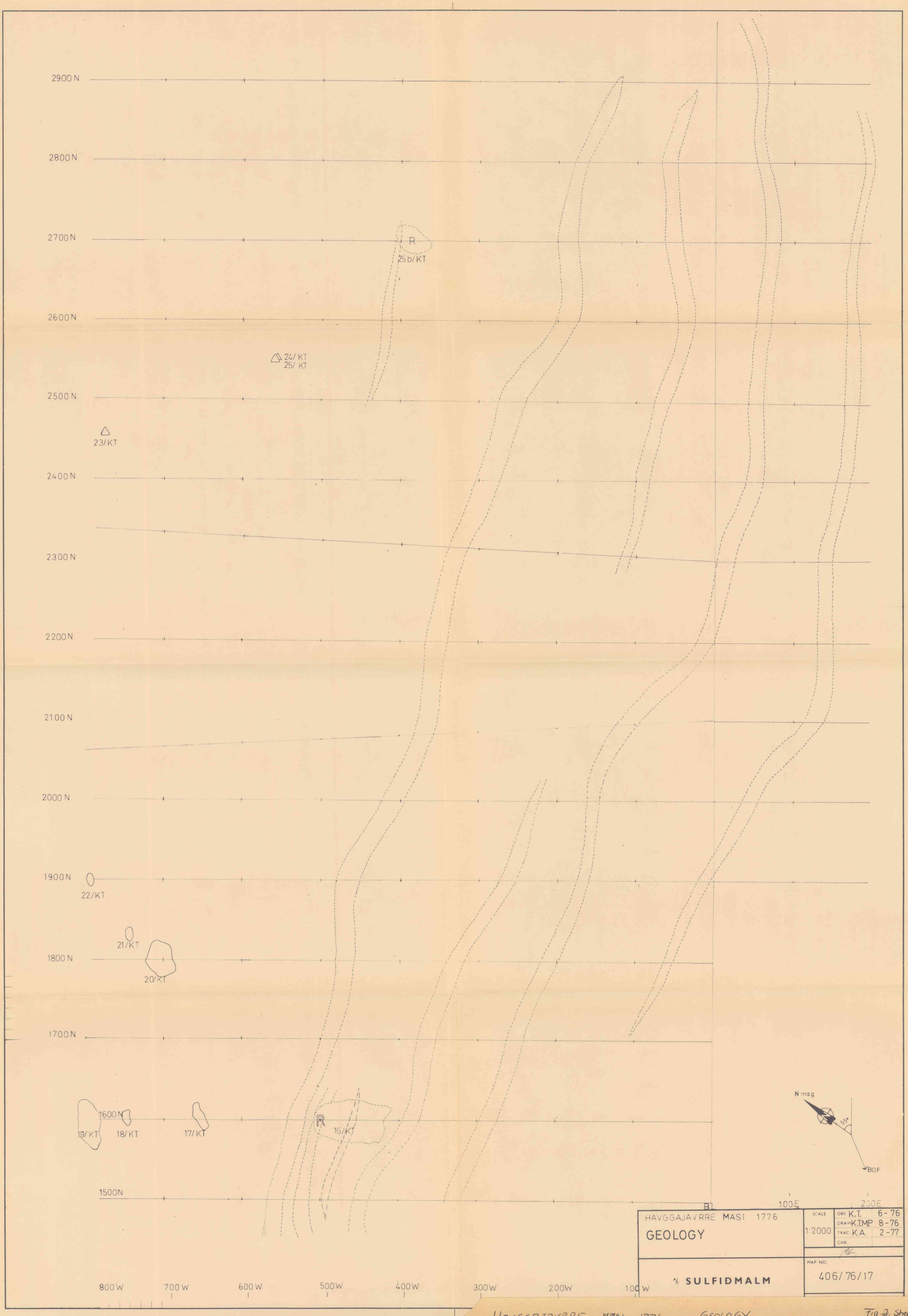
GEOLOGY

Skilleblad nr. 1067
R.A.



HAVGGAJAVRRE MASI 1776 GEOLOGY

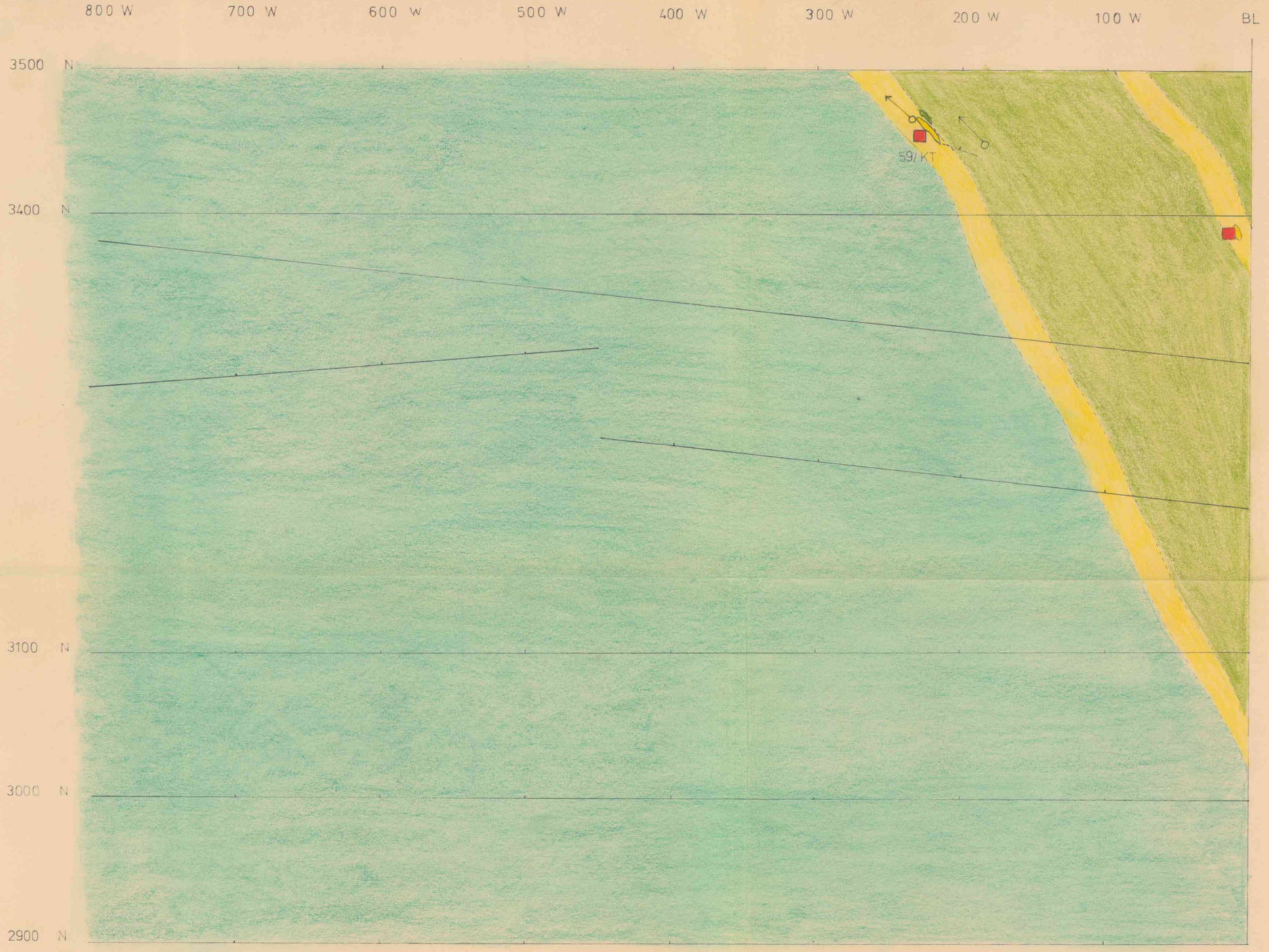
Fig. 2 Sheet 1.

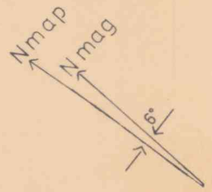


HAVGGAJAVRRE MASI 1776 GEOLOGY

Fig. 2. Sheet 2

A.s Terrkop. 3000 A1 E9 gl. 10-71. Sentrum Trykkeri.





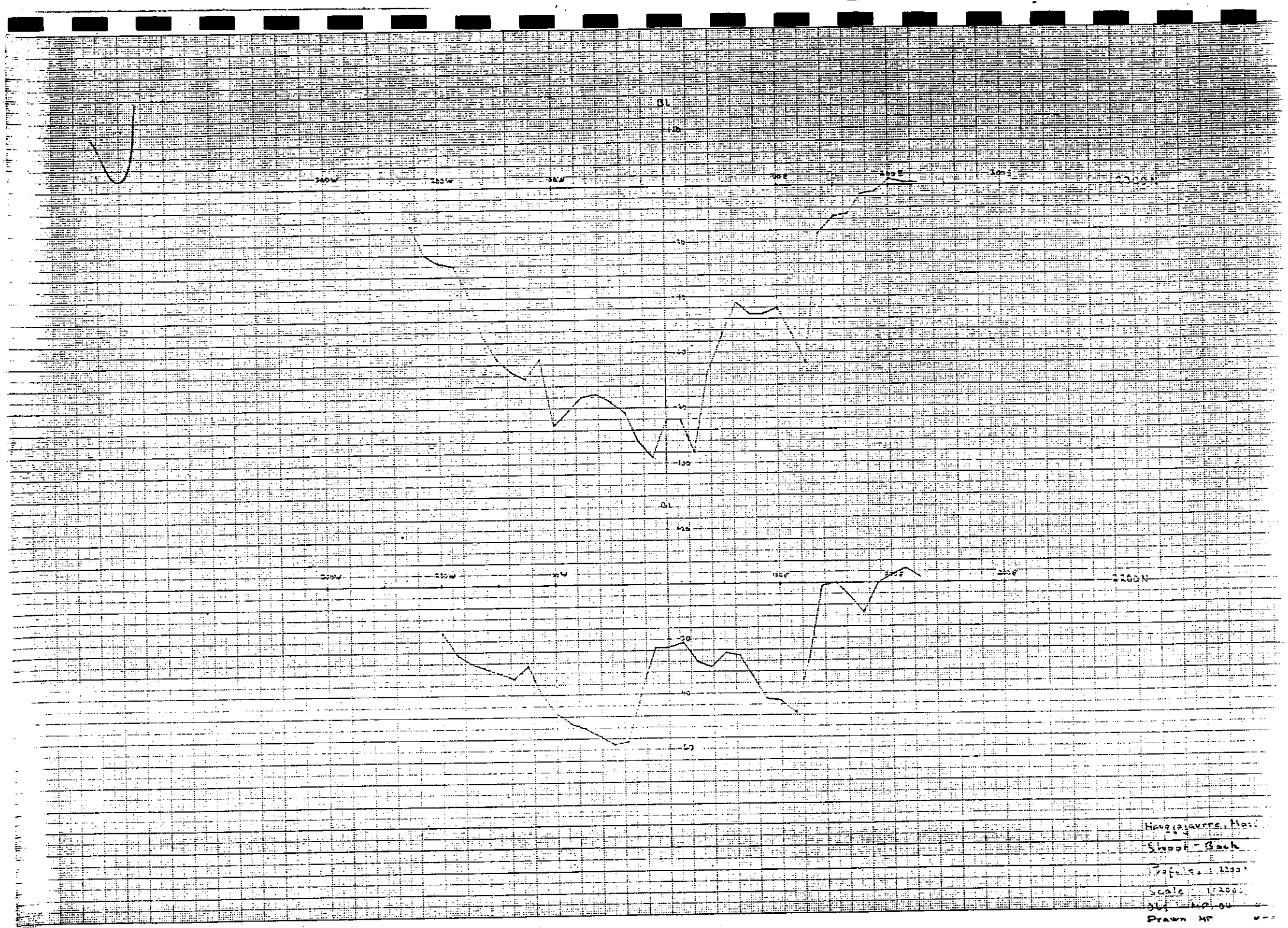
HAVGGAJAVRRE MASI 1776 GEOLOGY	SCALE 1:2000	OBS. KT	JUNE-76
		DRAW. KT	AUG.-76
		TRAC.	
		CHK.	
		MAP NO.	
⅘ SULFIDMALM		406 / 76 / 17	

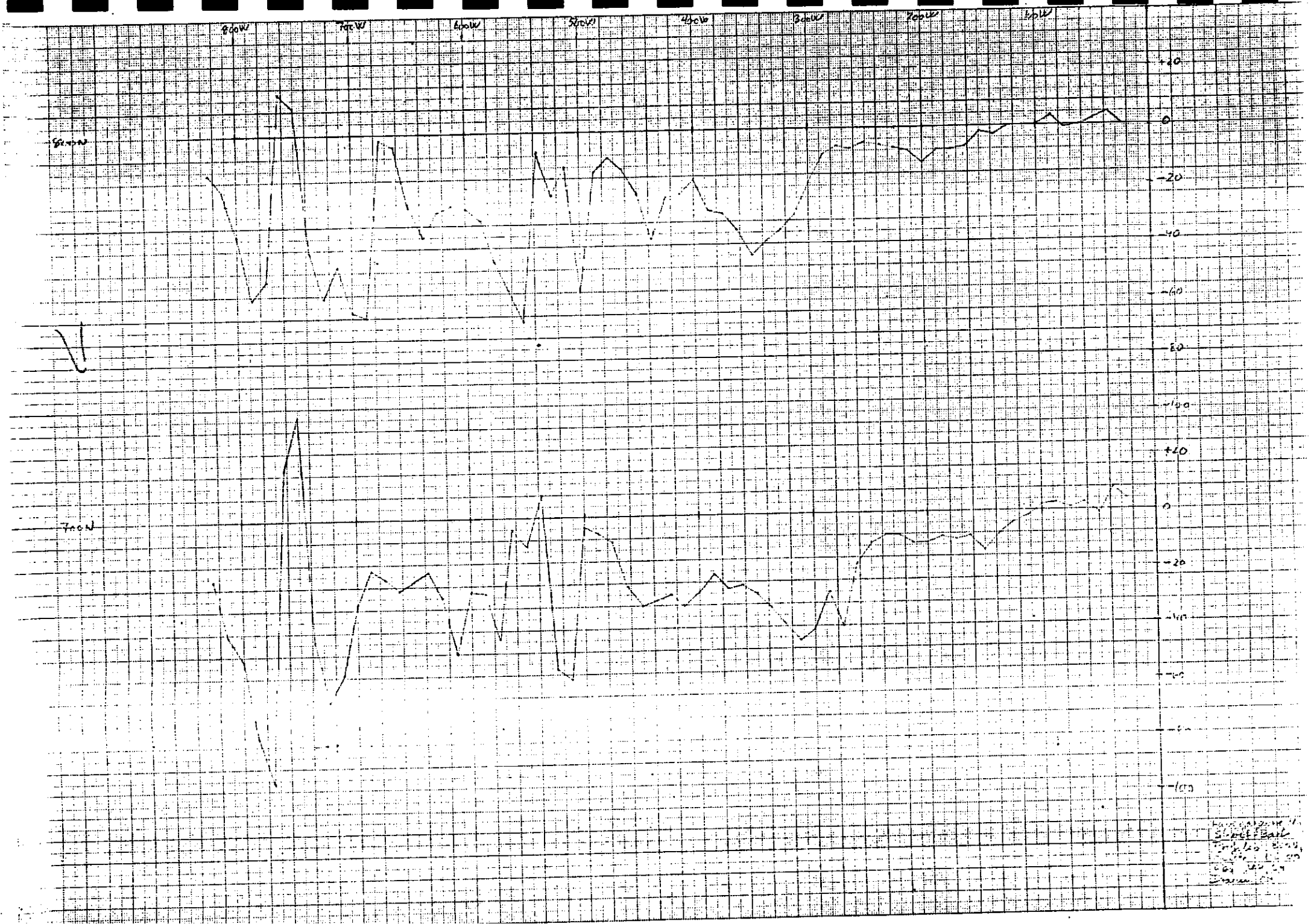
A.s Tørrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.

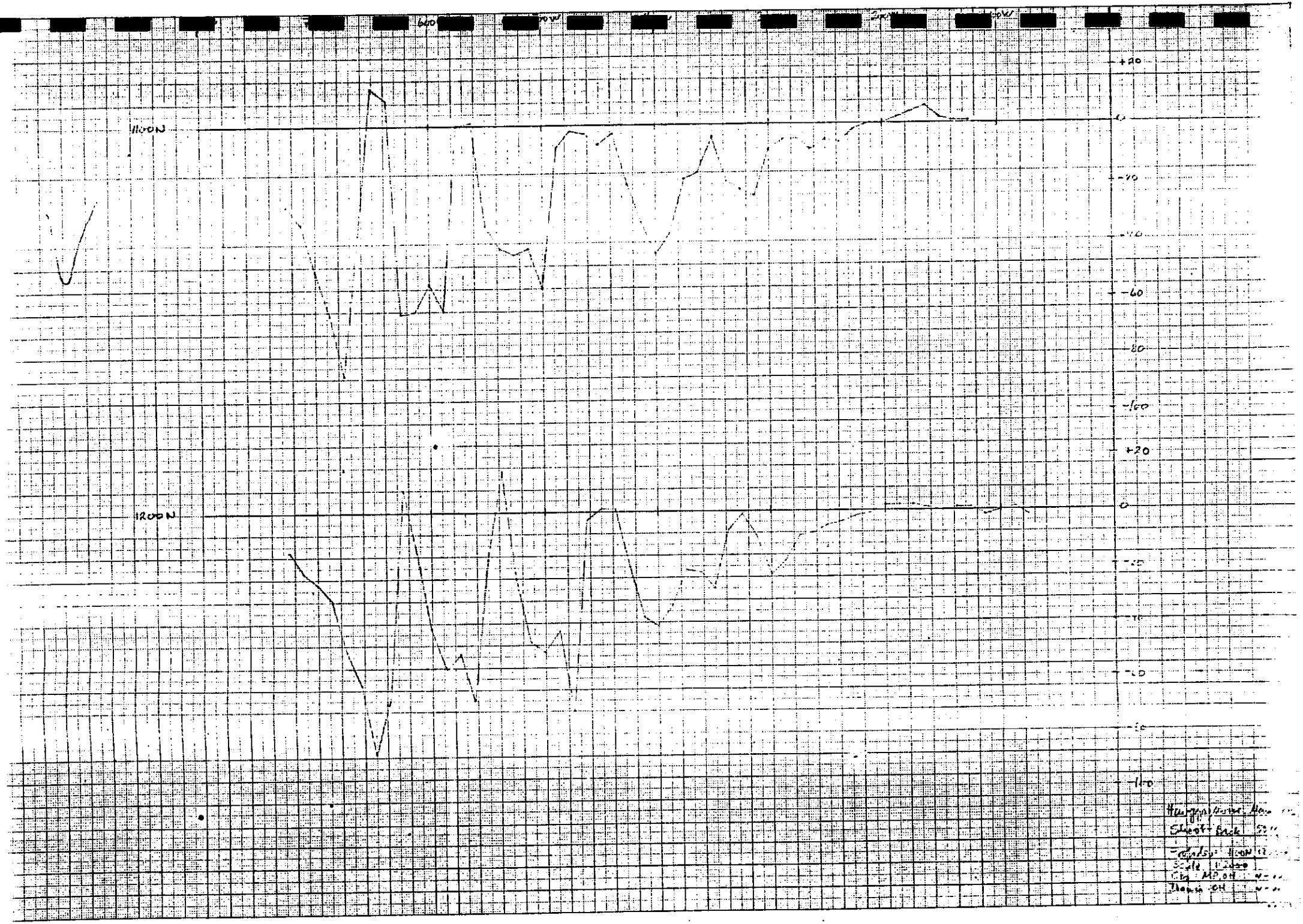
HAVGGAJAVRRE MASI 1776. GEOLOGY

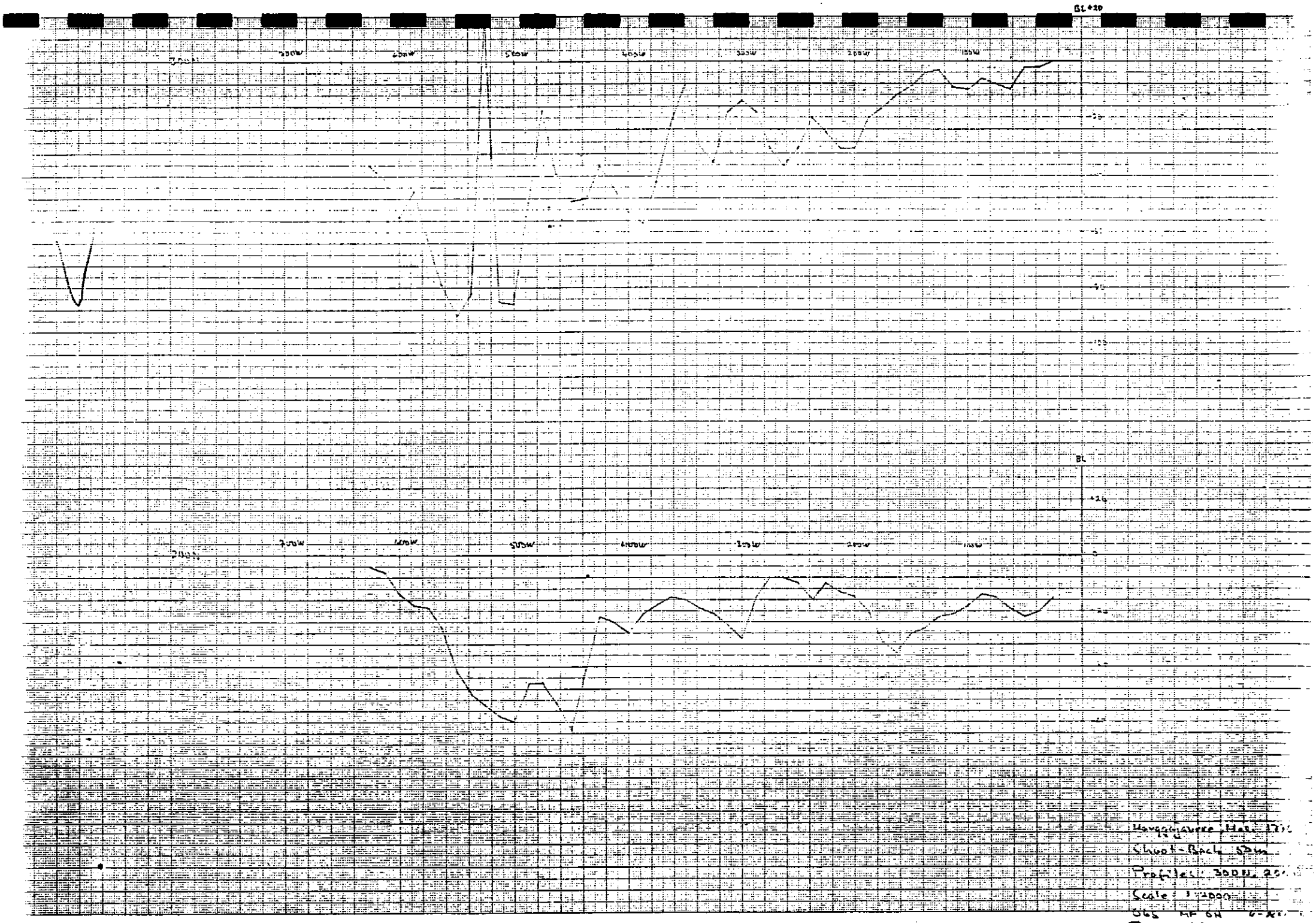
Fig 2. Sheet 3

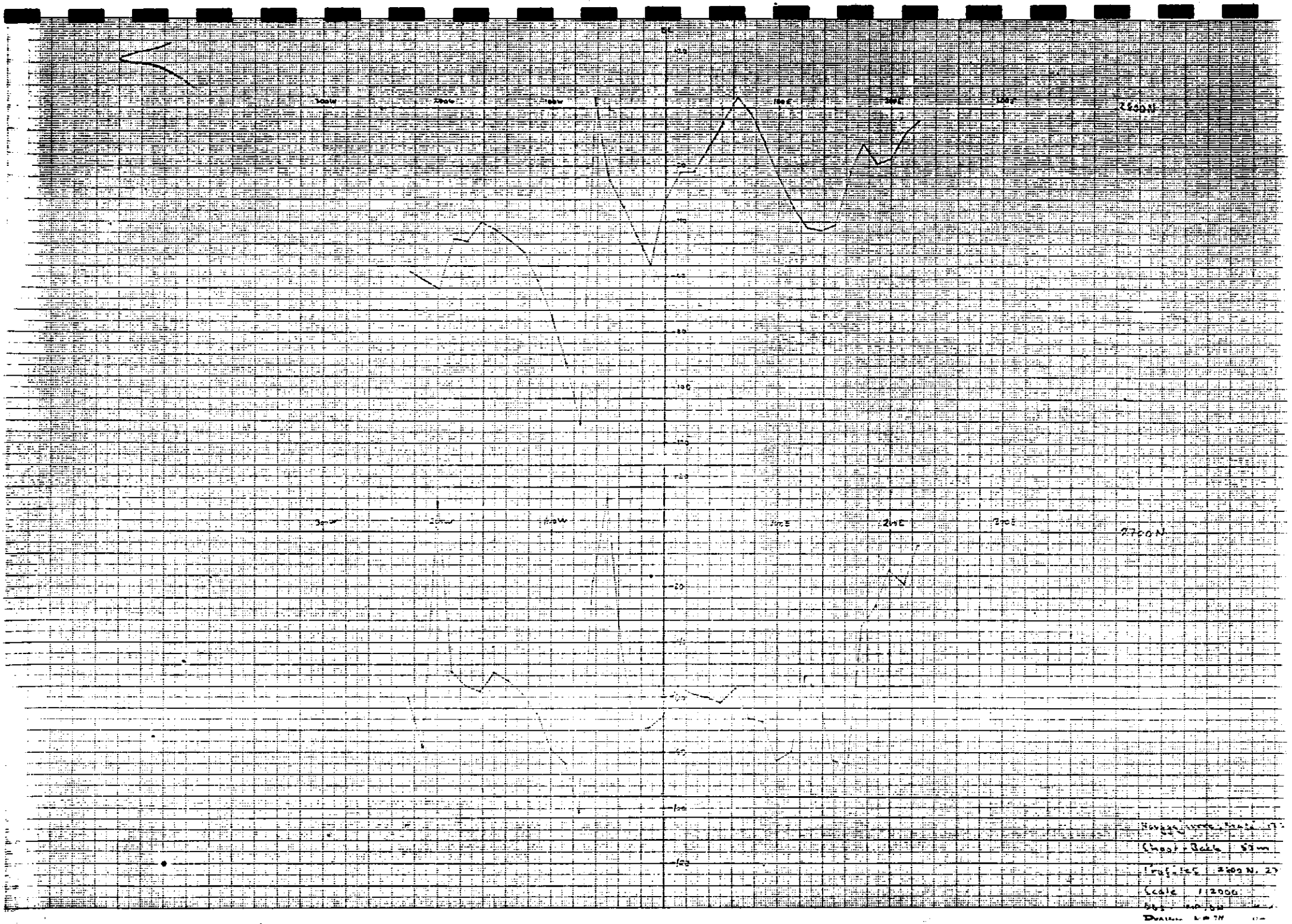
GEOPHYSICS

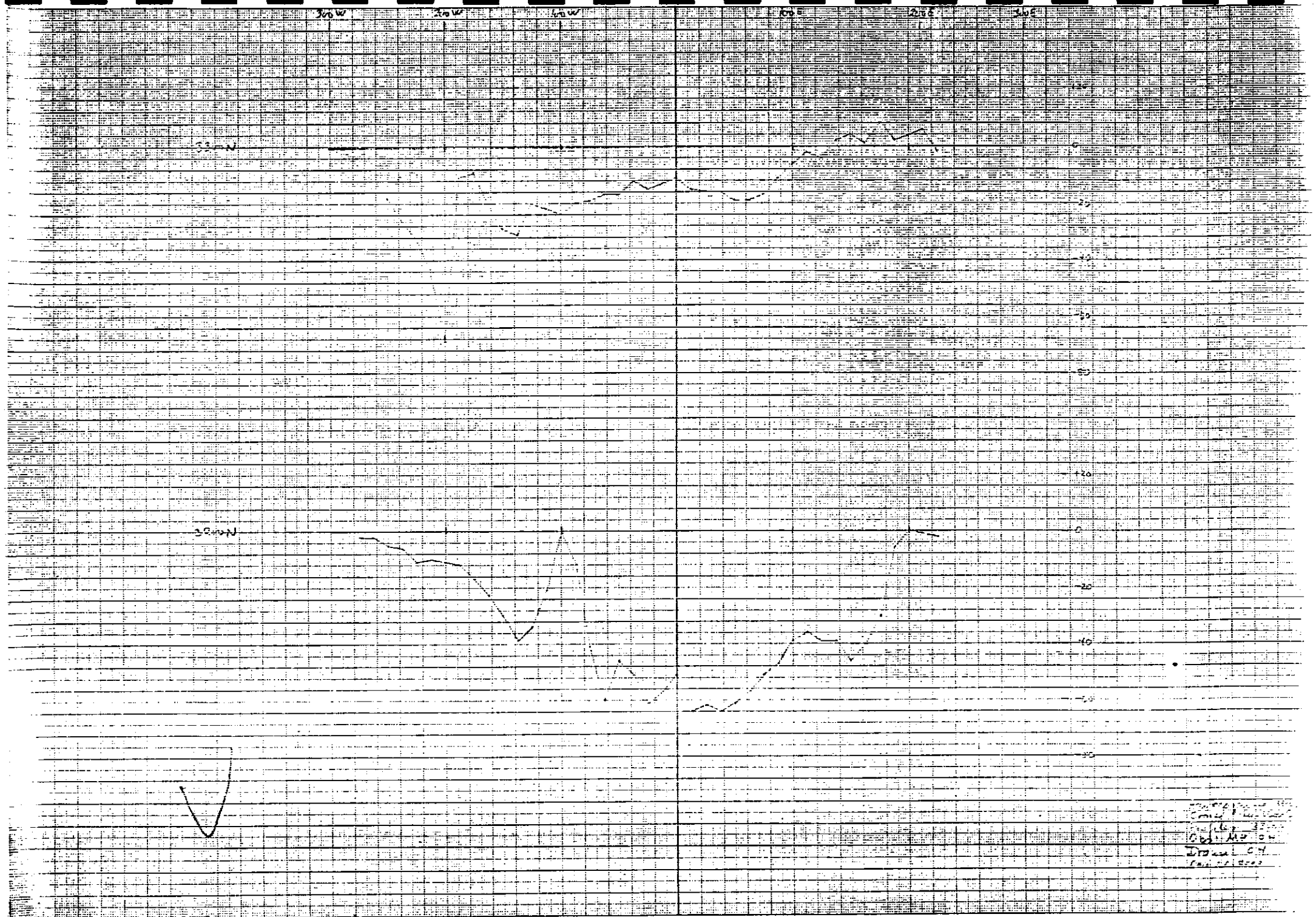

BL
BL
Scale
Drawn MP

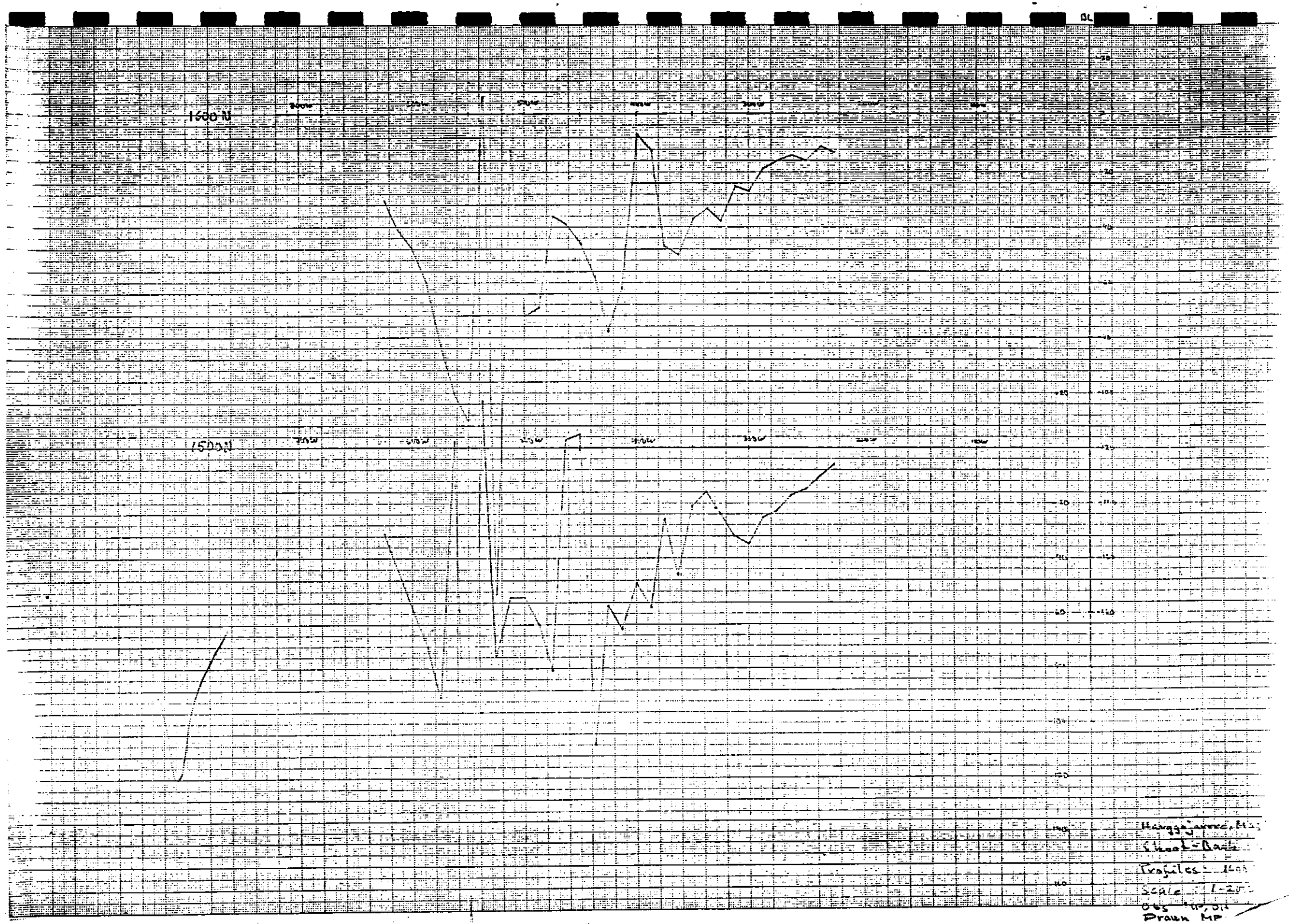

800W
700W
600W
500W
400W
300W
200W
100W
+20
0
-20
-40
-60
-80
-100
+20
0
-20
-40
-60
-80
-100

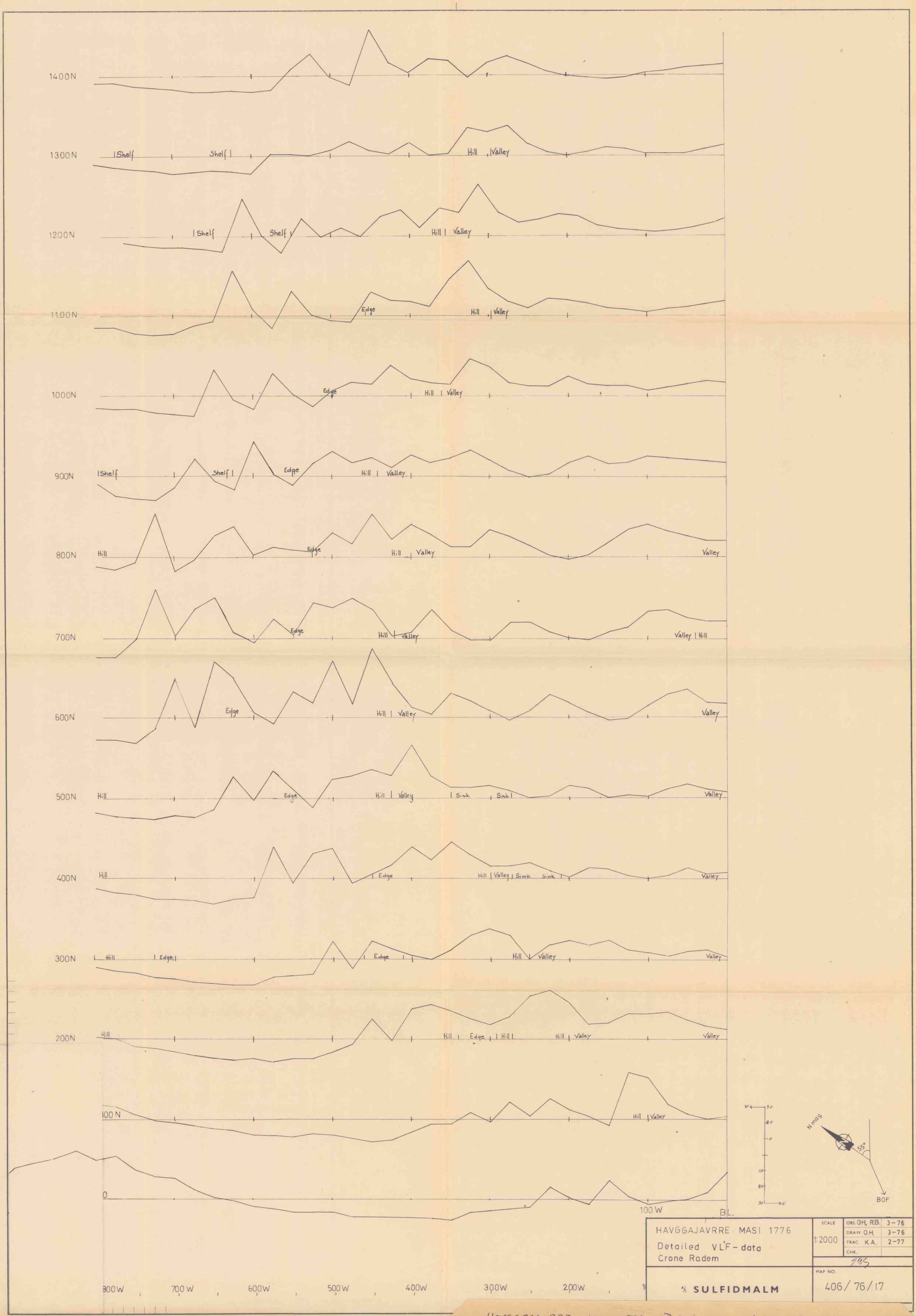

1100N
1200N
+20
0
-40
-60
-80
-100
+20
0
-10
-20


BL+20
BL
Scale: 1:2000


2600N
2700N
Scale 1:2000

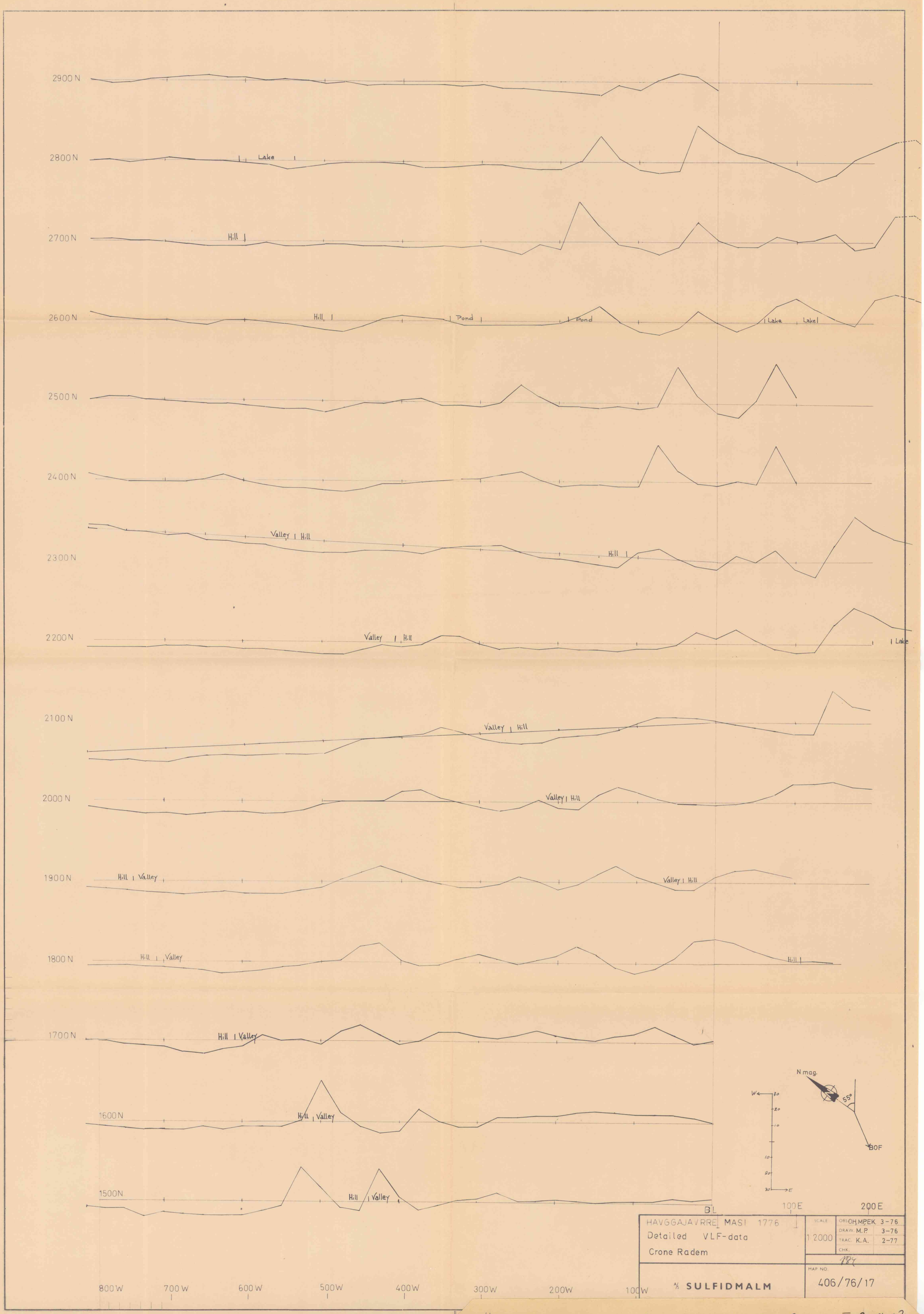

300 W
200 W
100 W
100 E
200 E
300 E
30°N
30°N
+20
0
-20
-40
-60
-80


1600 N
1500 N
Hargaja
Sheet - Base
Profiles
Scale 1:20
Obs
Drawn MP

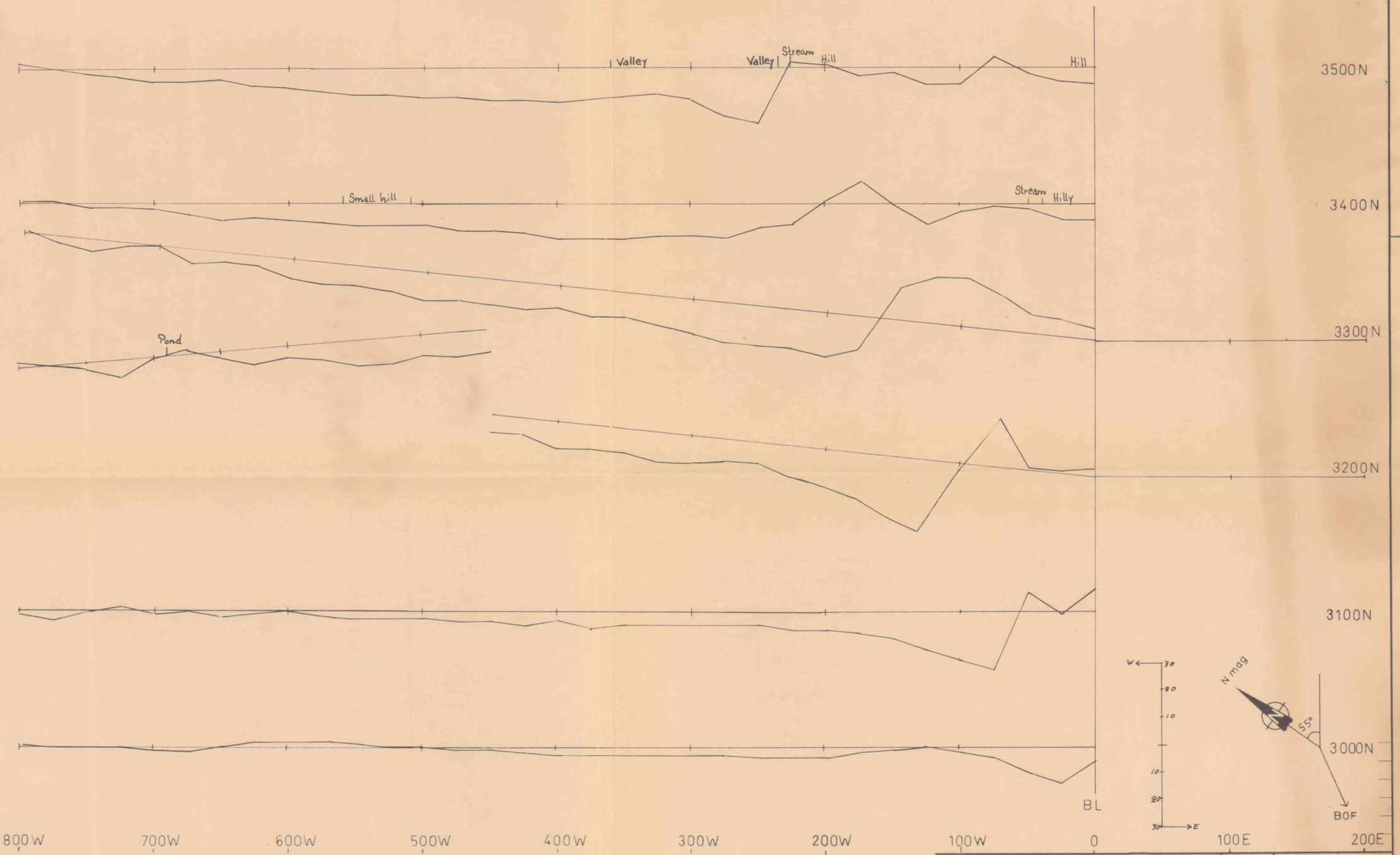


HAVGGAJAVRRE MASI 1776 Detailed VLF-data Crone Radem	SCALE 1:2000	OBS. OH, RB.	3-76
		DRAW. O.H.	3-76
		TRAC. K.A.	2-77
		CHK.	
% SULFIDMALM	MAP NO. 406/76/17		

HAVGGAJAVRRE MASI 1776 Detailed VLF-data Crone radem Fig. 3. Sheet 1



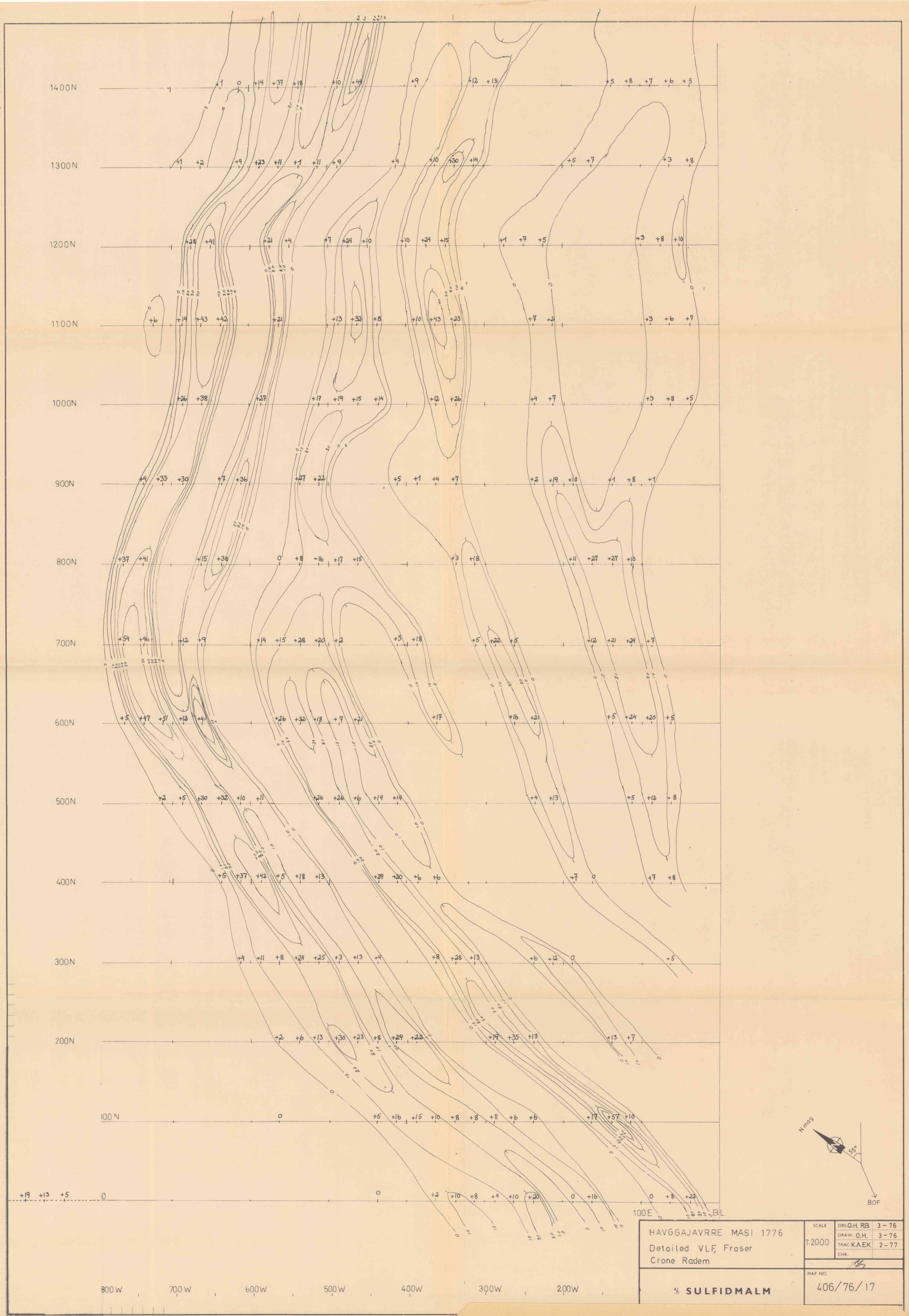
HAVGGAJAVRRE MASI 1776, Detailed VLF-data Crone Radem Fig. 3 Sheet 2



HAVGGAJAVRRE MASI 1776	SCALE	OBS OH.M.P.EK	3-76
Detailed VLF-data	1: 2000	DRAW. M.P.	3-76
Crone Radem		TRAC. K.A.	2-77
		CHK.	
⅓ SULFIDMALM		MAP NO. 406/76/17	

A.s Tørrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.

HAVGGAJAVRRE MASI 1776, Detailed VLF-data Crone Radem Fig. 3 Sheet 3



HAVGGAJAVRRE MASI 1776, Detailed VLF, Fraser Crone Radem Fig. 3 Sheet 4

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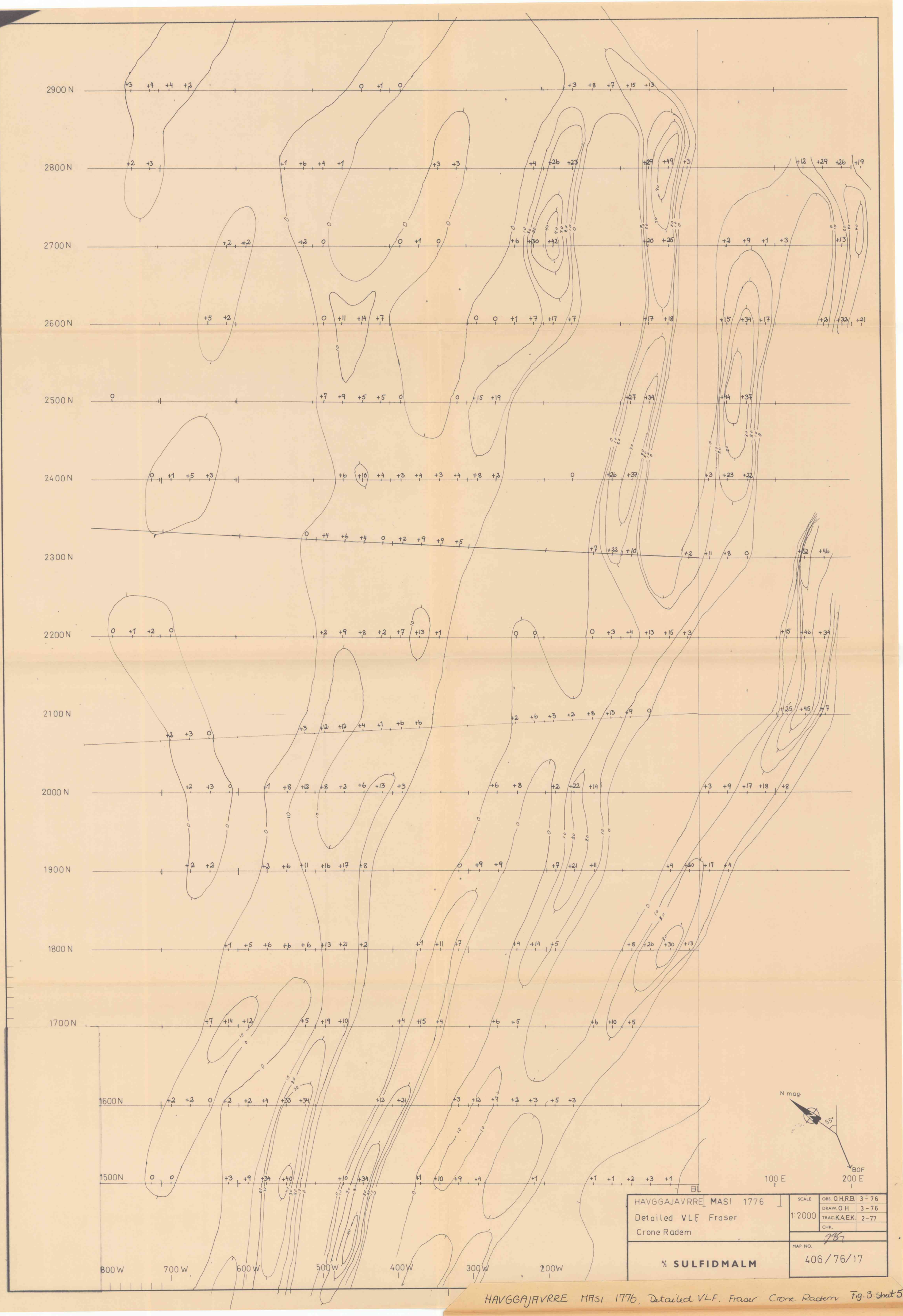
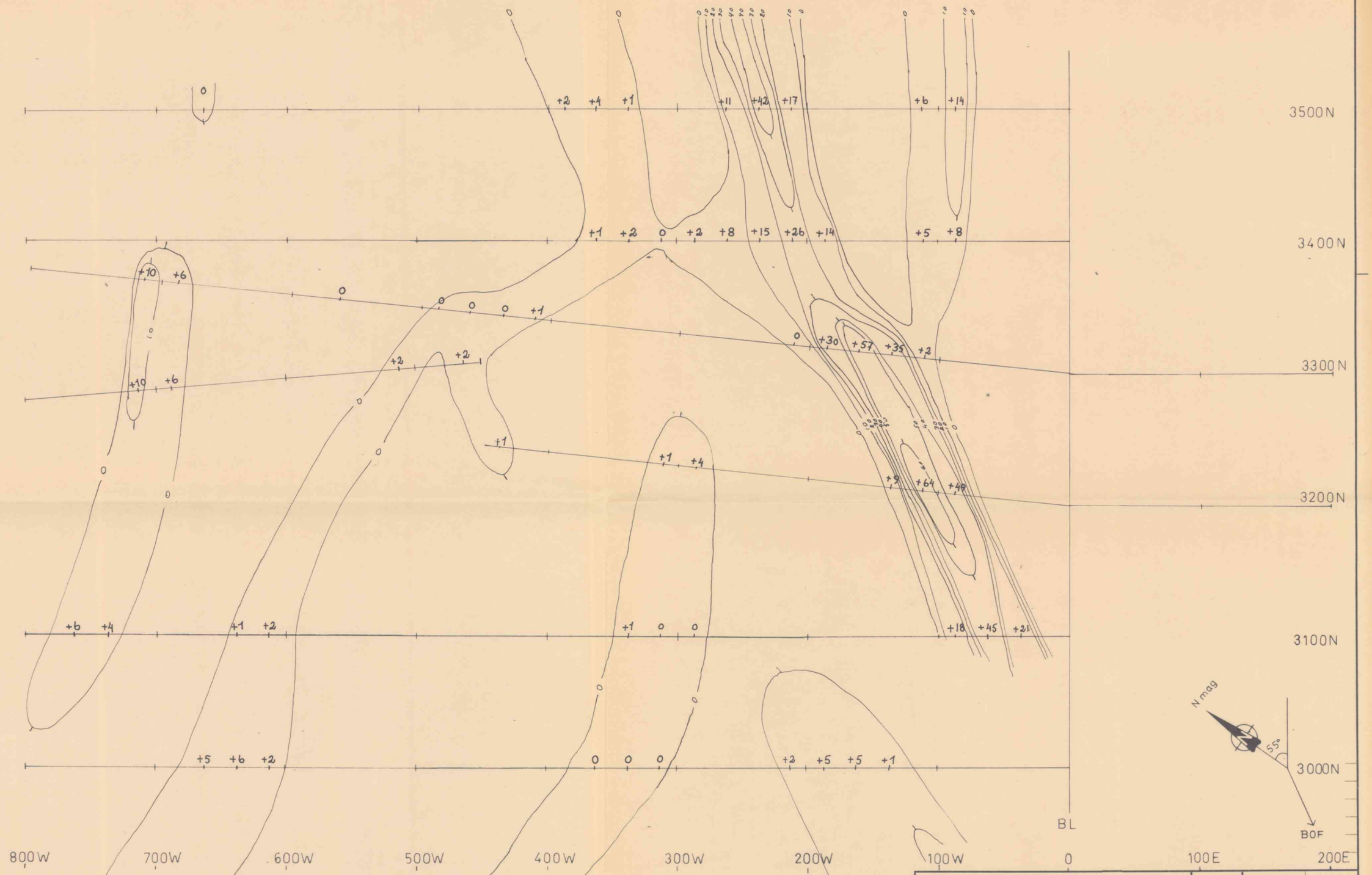


HAVGGAJAVRRE MASI 1776, Detailed VLF, Fraser Crone Radem Fig. 3. Sheet 5



HAVGGAJAVRRE MASI 1776

Detailed VLF, Fraser

Crone Radem

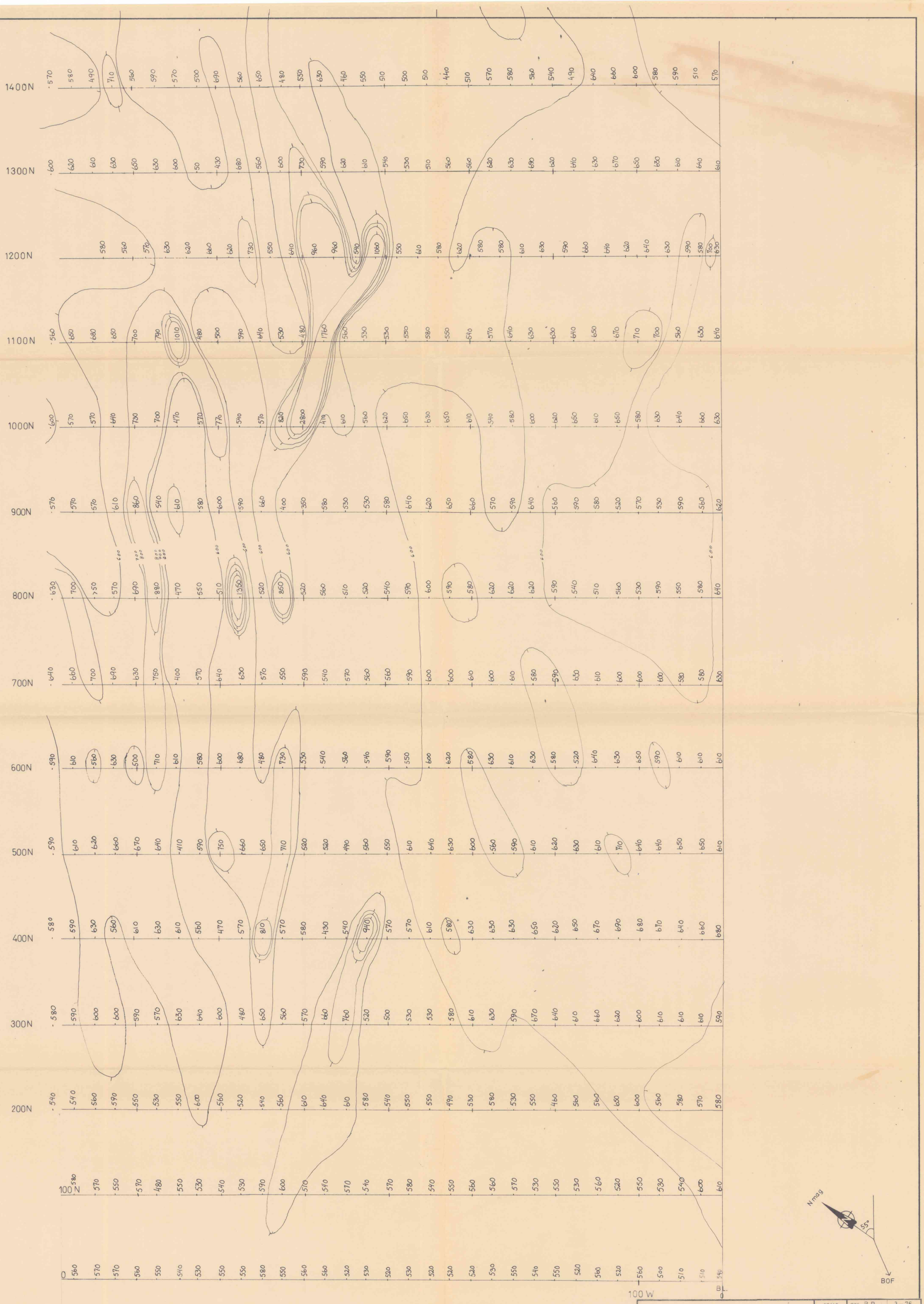
⅓ SULFIDMALM

SCALE 1: 2000	OBS. O.H.M.P.E.K.	3 – 76
	DRAW. O.H.	3 – 76
	TRAC. K.A.E.K.	2 – 77
	CHK.	

MAP NO. 406/76/17

A.s Tørrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.

HAVGGAJAVRRE MASI 1776, Detailed VLF, Fraser Crone Radem Fig. 3 Sheet 6



HAVGGAJAVRRE MASI 1776
Magnetic survey
Mc Phar 700

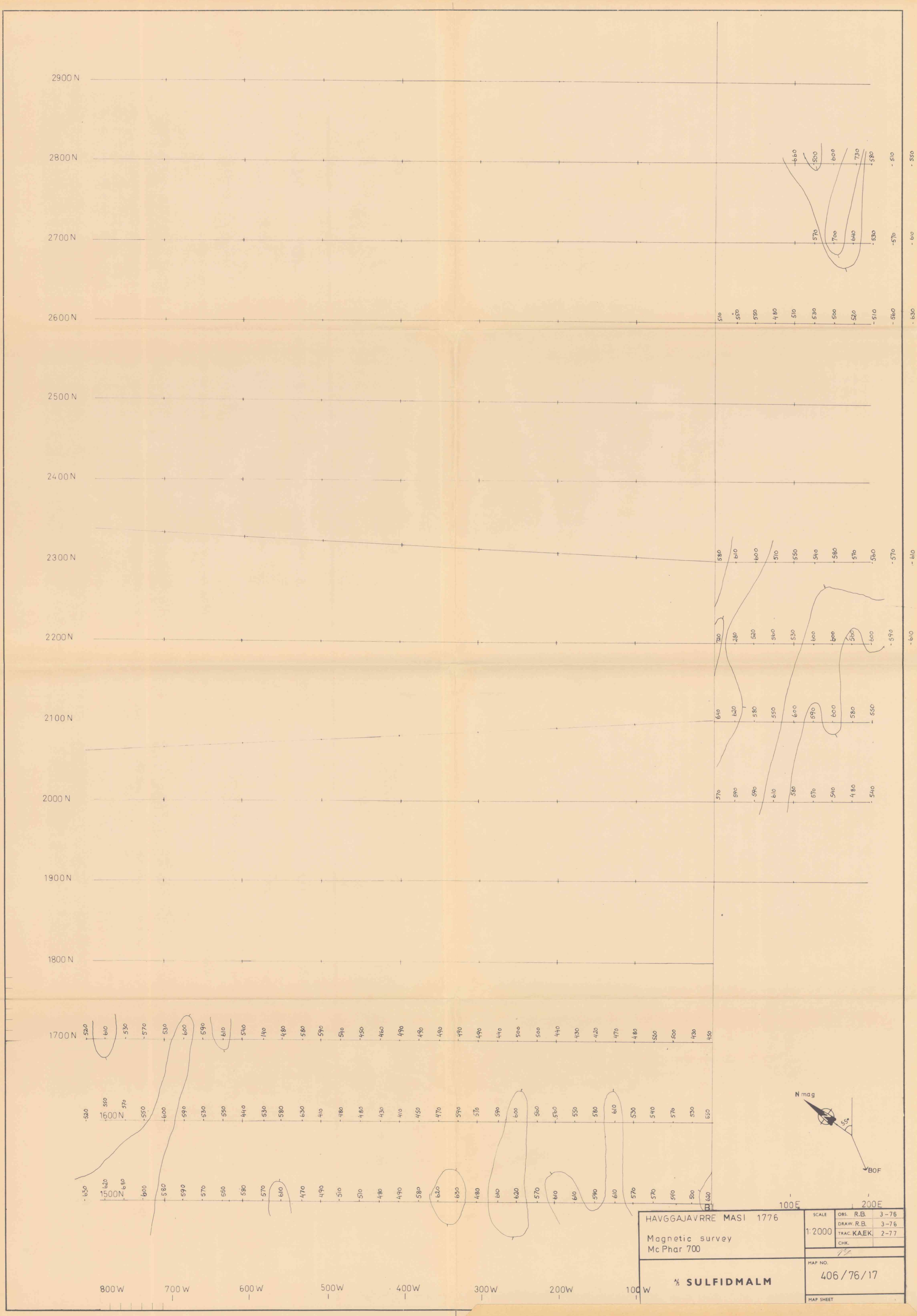
SCALE 1:2000

OBS.	R.B.	3-76
DRAW.	R.B.	3-76
TRAC.	KA.EK.	2-77
CHK.		

MAP NO. 406/76/17

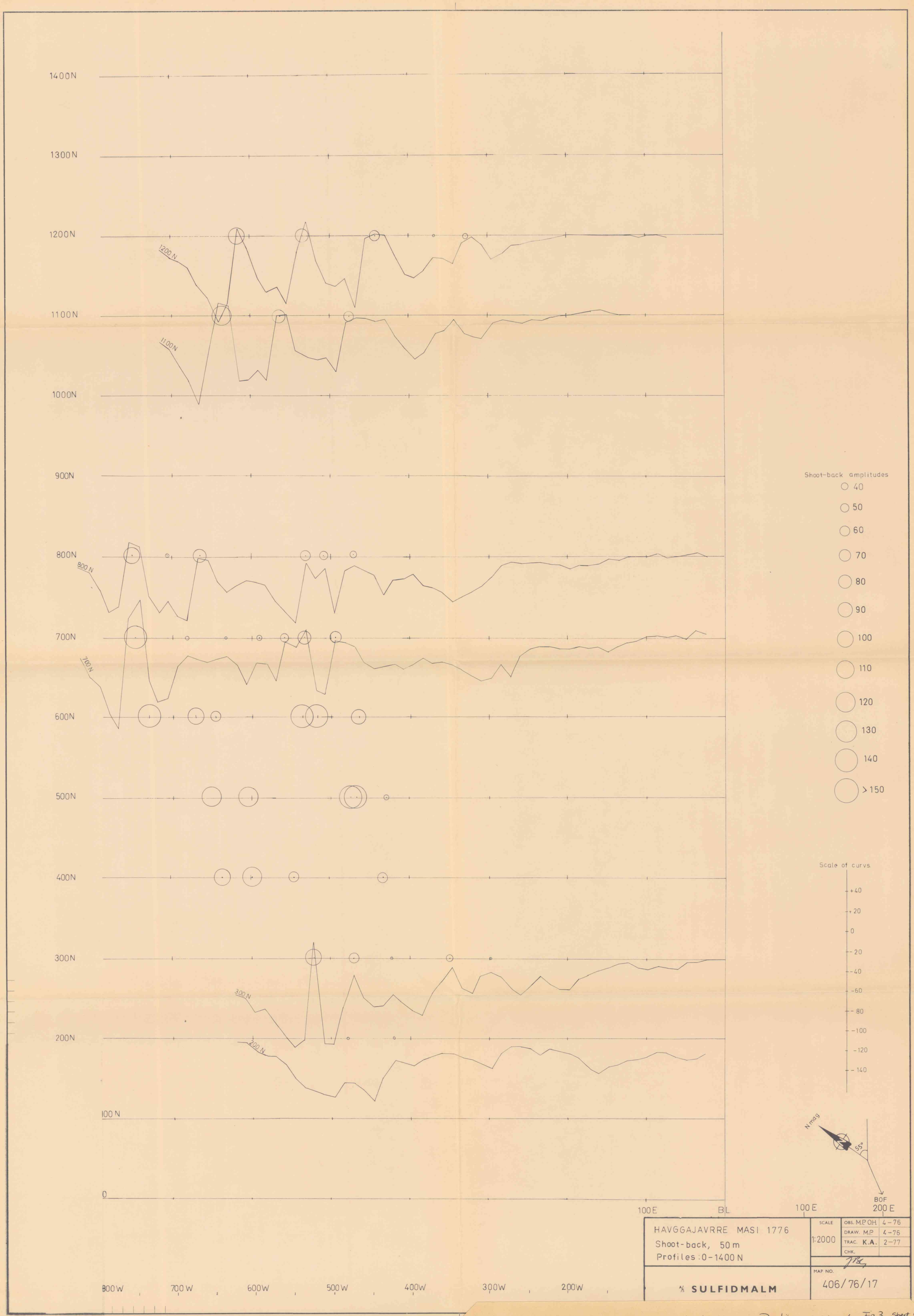
½ SULFIDMALM

HAVGGAJAVRRE MASI 1776, Magnetic survey McPhar 700. Fig. 3 sheet 7

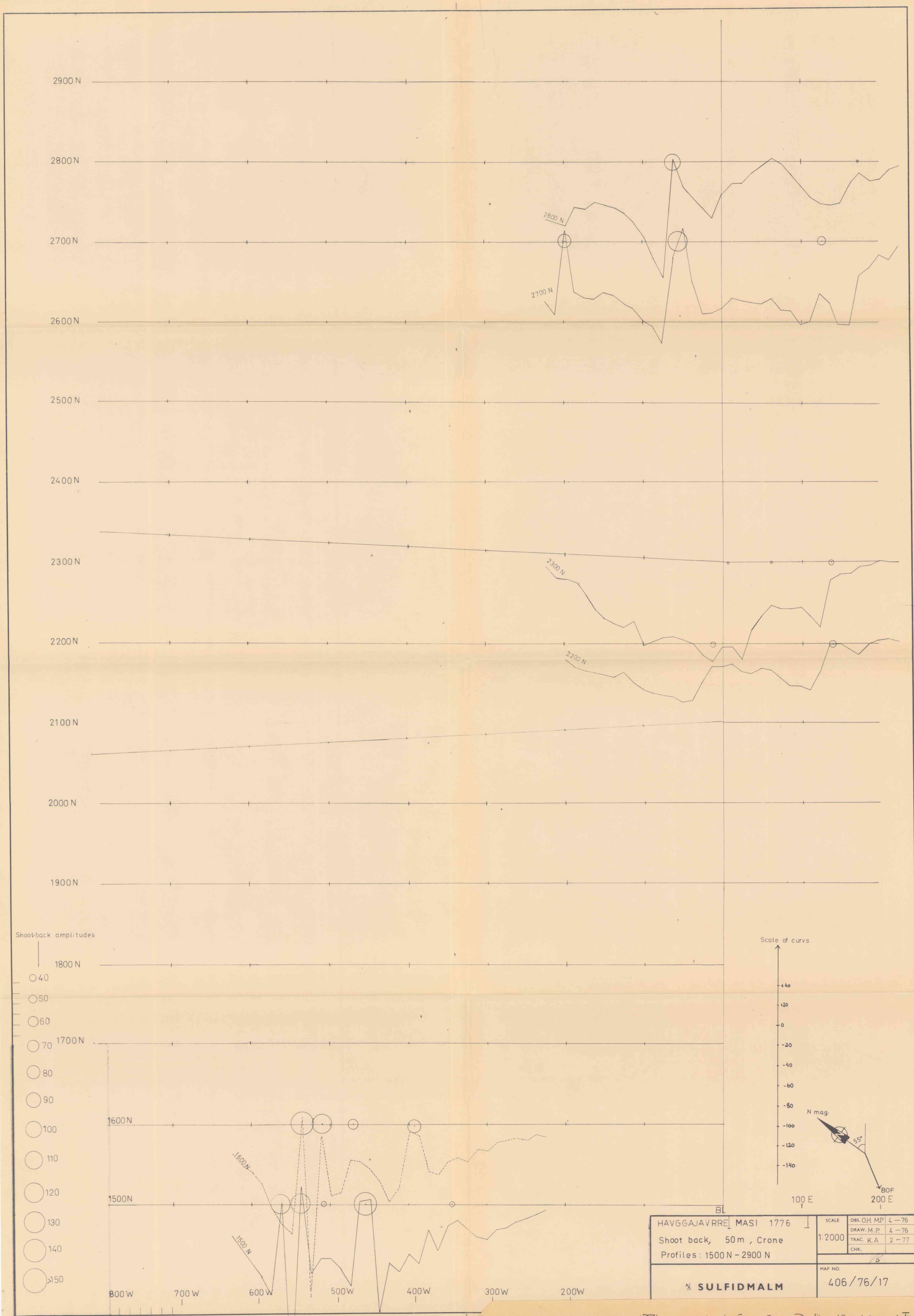


HAVGGAJAVRRE MASI 1776, Magnetic survey McPhar 700 Fig. 3. Sheet 8

A.s Terskopi. 3000. A1. E 9 gl. 10-71. Sentrum Trykkeri.



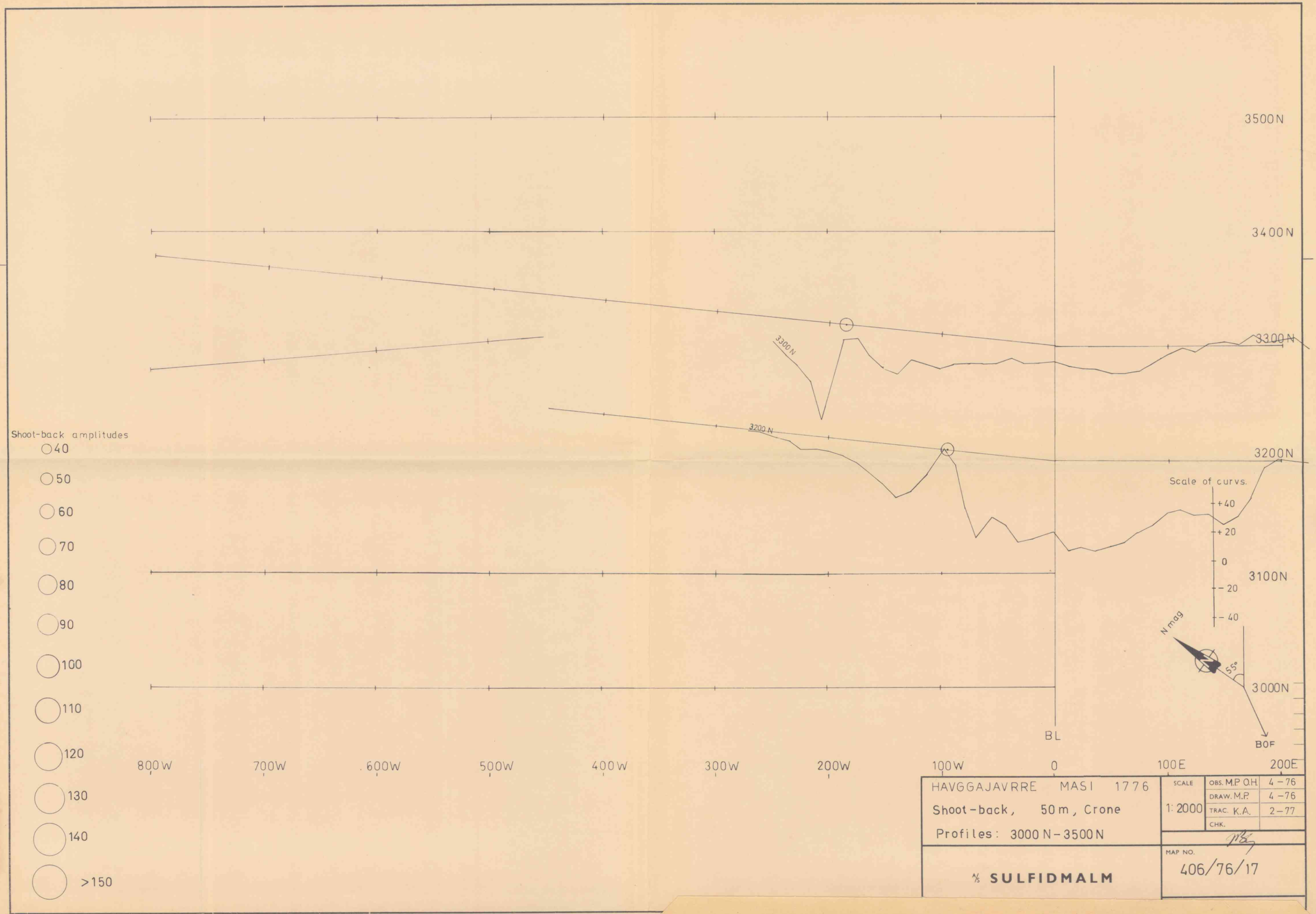
HAVGGAJAVRRE MASI 1776, Shoot-back 50m Profiles: 0-1400 N Fig 3. Sheet 9



HAVGGAJAVRRE MASI 1776	SCALE	OBS. O.H. M.P.	4 — 76
Shoot back, 50 m, Crone	1:2000	DRAW. M.P.	4 — 76
Profiles: 1500 N – 2900 N		TRAC. K.A	2 — 77
		CHK.	
⅛ SULFIDMALM	MAP NO. 406/76/17		

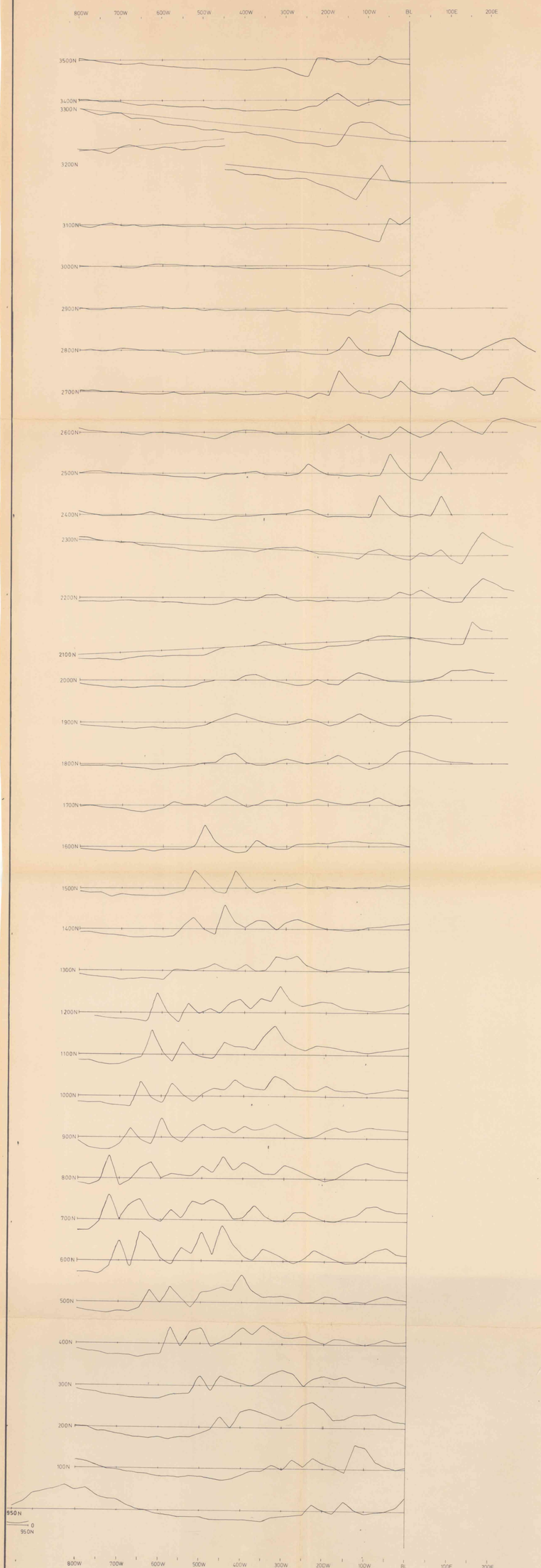
HAVGGAJAVRRE MASI 1776, Shoot-back 50m, Crone Profiles 1500N-2900N Fig. 3 Sheet 10

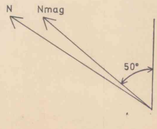
A.s Terskop. 3000 A 1 E 9 el. 10-71. Sentrum Trykkeri.



A.s Tarrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.

HAVGGAJAVRRE MASI 1776. Shoot-back. 50m. Crone Profiles: 3000N-3500N Fig. 3 Sheet II





Havggajavrre, Masi 1776

Detailed VLF ON-3500N

SCALE	OBS.	OHMP/EK	03-
1 : 4000	DRAW.	MP	03-
	TRAC.	KG	06-
	CHK.		

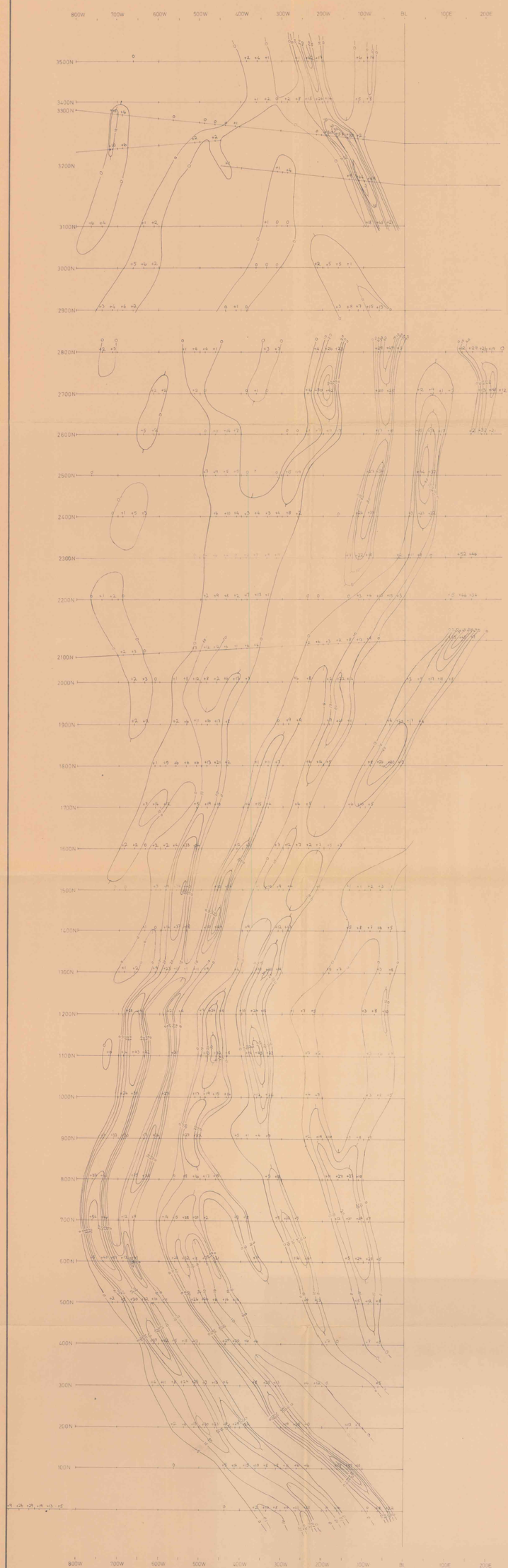
MAP NO. 406/76/17

MAP SHEET

½ SULFIDMALM

HAVGGAJAVRRE, MASI 1776 Detailed VLF ON 3500N

Fig 3. Sheet 12

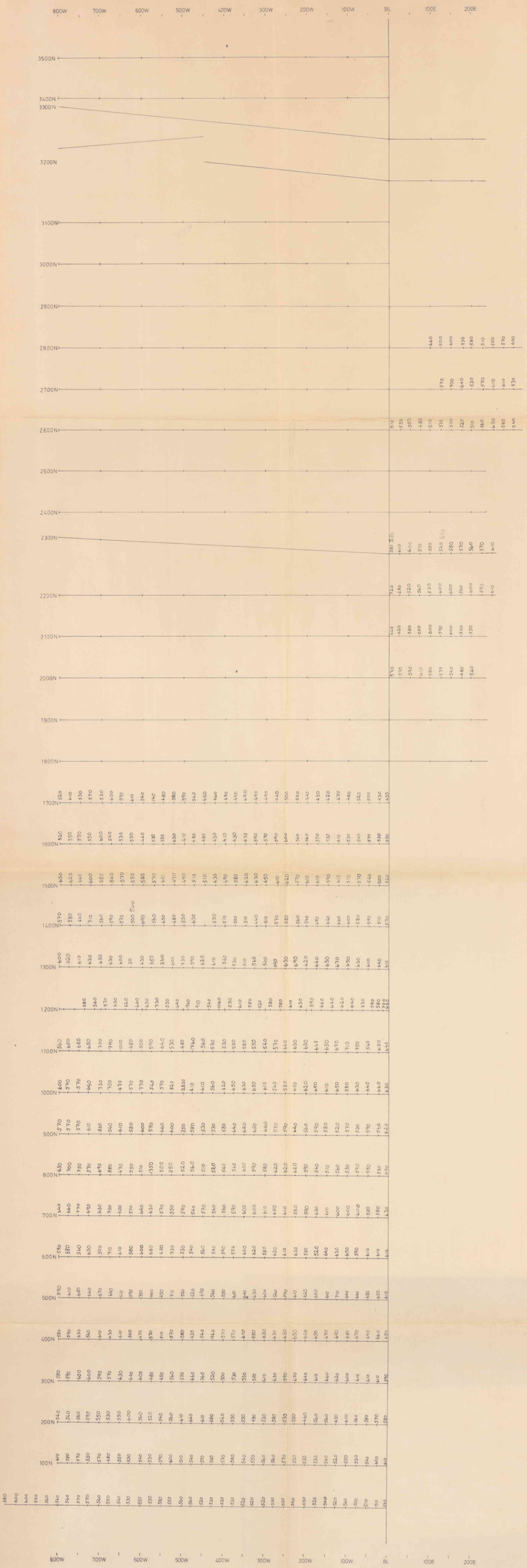


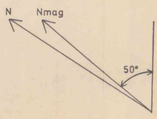
N Nmag

50°

Havggajavrre, Masi 1776 **Detailed VLF** **Fraser contours**	SCALE 1:4000	OBL.CH.MP.EK	3-76
		DRAW. OH	4-76
		TRAC. KG	6-76
		CHK.	
% SULFIDMALM		MAP NO. 406/76/17	
		MAP SHEET	

HAVGGAJAVRRE, MASI 1776 Detailed VLF Fraser contours Fig 3 Sheet 13





Havggajavrre, Masi 1776

Magnetic Survey 0N-3500N

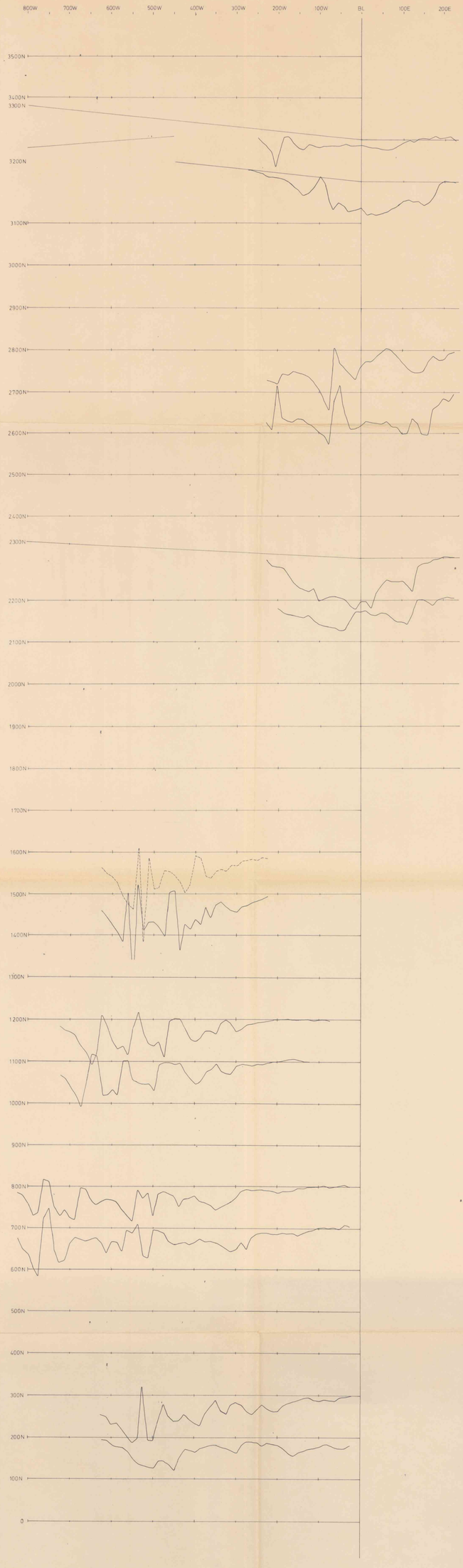
½ SULFIDMALM

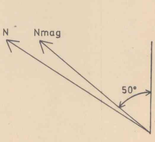
SCALE	OBS.	RB	3-7
1:4000	DRAW.	RB	3-7
	TRAC.	KG	3-7
	CHK.		

MAP NO. 406/76/17

MAP SHEET

HAVGGAJAVRRE, Masi 1776 Magnetic Survey 0N-3500N Fig 3 Sheet 14.





Havggajavrre, Masi 1776

Shoot-Back 50m ON-3500N

SCALE 1:4000	OBS. MP/OH	4-
	DRAW. MP	4-
	TRAC. MP/KG	4-76
	CHK.	

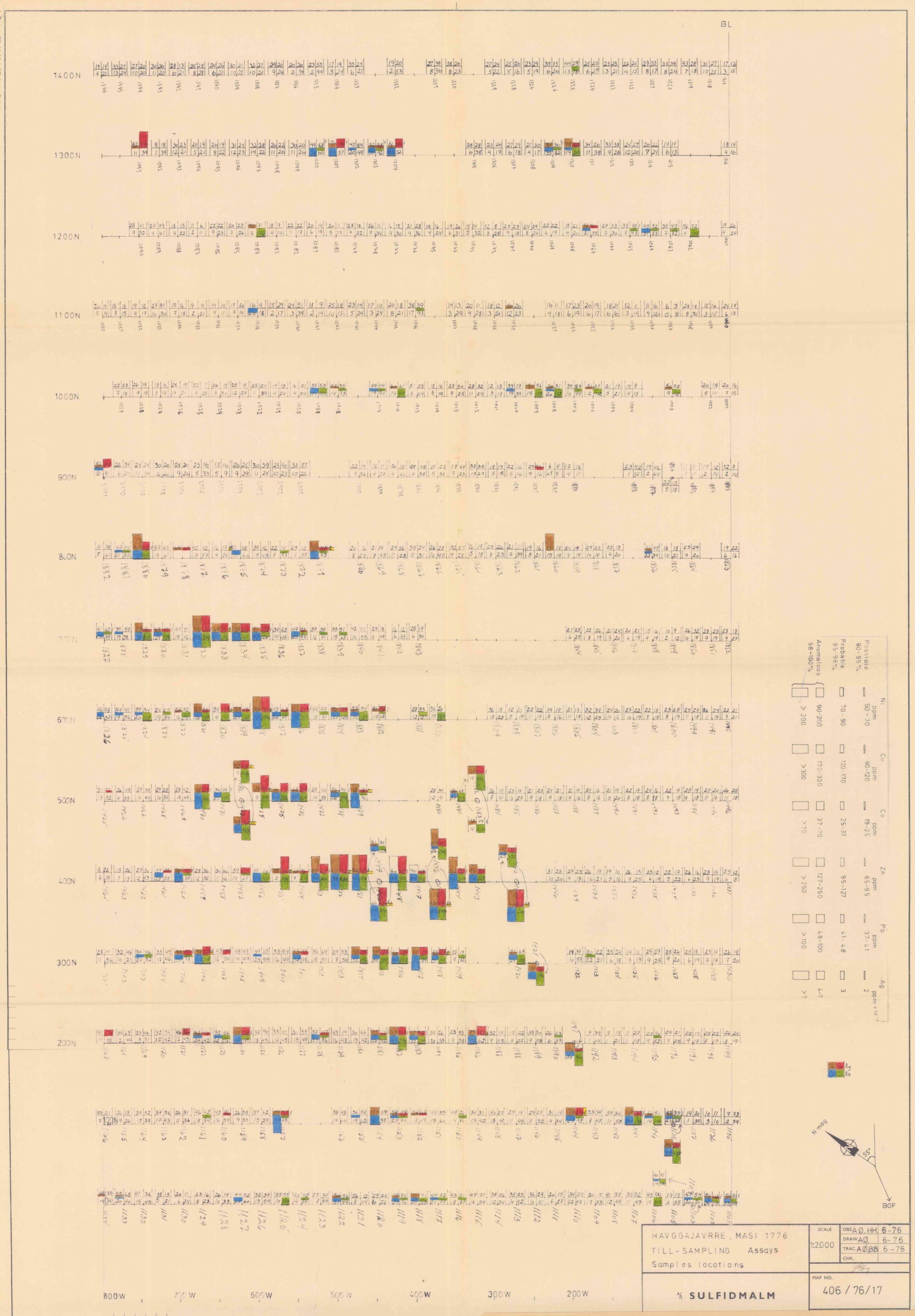
½ SULFIDMALM

MAP NO. 406/76/17

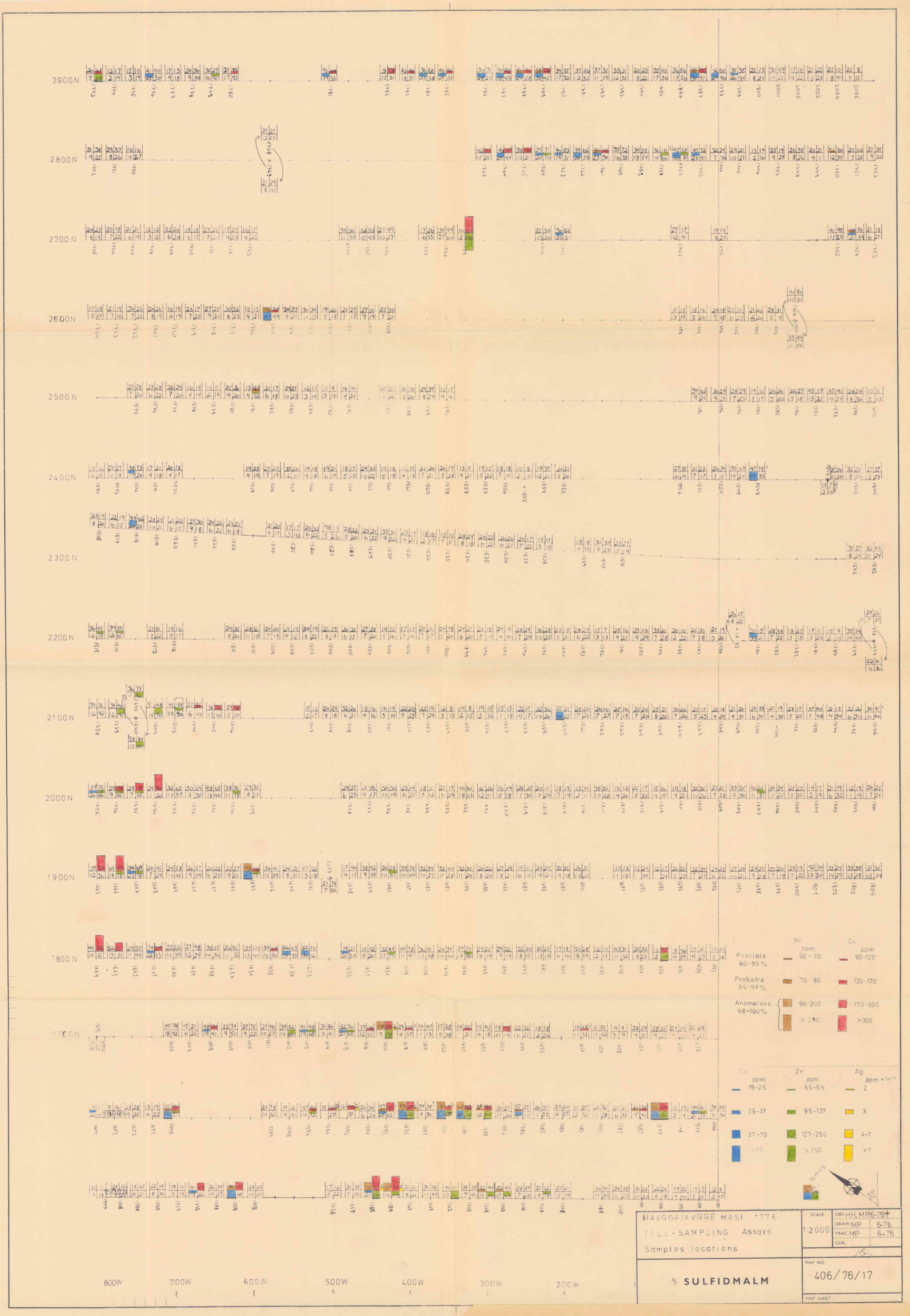
MAP SHEET

HAVGGAJAVRRE, Masi 1776 Shoot-back 50m ON 3500N Fig 3. Sheet 15.

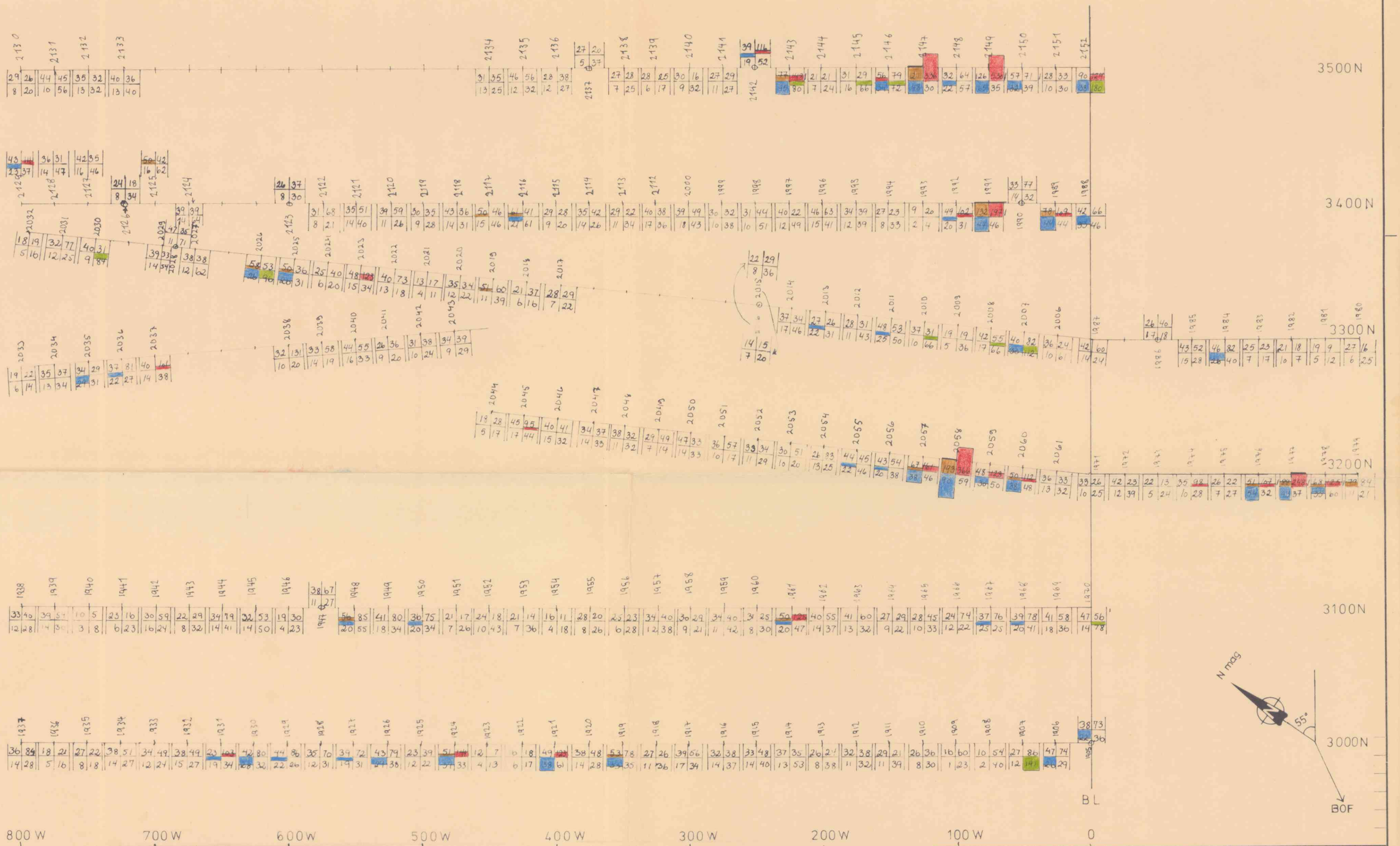
GEOCHEMISTRY



HAVGGAJAVRRE Masi 1776 Till-sampling Assays Samples locations Fig.4. Sheet 1.



HAVGGAJAVRRE MASI 1776 Till-sampling Assays Samples locations Fig 4. Sheet 2



	Ni ppm	Cu ppm	Co ppm	Zn ppm	Pb ppm	Ag ppm $\times 10^{-1}$
Possible 90-95 %	50 - 70	90-120	19-25	65-95	37-41	2
Probable 95-98 %	70 - 90	120-170	25-37	95-127	41-48	3
Anomalous 98-100 %	90-200	170-300	37-70	127-250	48-100	4-7
	> 200	>300	>70	> 250	> 100	>7

Ni Cu Ag
Co Zn As

HAVGGAJAVRRE , MASI 1776
TILL - SAMLING
Samples locations
Assays

SCALE		
1: 2000	OBS. MP. HH.	6-76
	DRAW. MP	6-76
	TRAC. MP.	6-76
	CHK.	

MAP NO. 408/76/17

⅛ SULFIDMALM

A.s Tørrkopi. 2000. A 2. E 9 gl. 10-71. Sentrum Trykkeri.

HAVGGAJAVRRE MASI 1776 Till-sampling Samples locations Assays Fig. 4. Sheet 3.