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Tittel

The Lomunda Area

Forfatter	Dato	Bedrift
	14.02 1983	Orkla Industrier A/S

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Rindal	Møre og Romsdal	Vestlandske		

Fagområde	Dokument type	Forekomster
Geologi Geofysikk Boring		Lomunda
Råstofftype Malm/metall	Emneord	

Sammendrag

ORKLA INDUSTRIER A.S
MINING SECTION, EXPLORATION

GULF - ORKLA

LØKKEN VENTURE

REPORT NO.: L.V. 16 DATE: Febr. 14. 1983
TITLE: The Lomunda Area

TABLE OF CONTENTS

ENCLOSURES

1. INTRODUCTION

The Lomunda area is located far west in the Løkken area (Encl. 1). It lyes south-east of Smørdalsfjellet and north-west of Lomunda river.

There are many old prospects in the area, and during different periods from 1935-1951, comprehensive turam measurements have been performed.

Several helicopter anomalies, both magnetic and electro-magnetic, were to be investigated the summer 1982.

This was done by VLF, magnetometer, and GENIE measure-ments, soil- and hardrock sampling and a brief geological mapping.

On the base of the investigations mentioned above, two diamond drill-holes were drilled.

2. GEOLOGY

Earlier the area has been briefly mapped by C.W. Carstens (before 1950) and F. Løset (1969). S. Kollung has been working in the western extension of the area.

In general, the Lomunda area is difficult to map properly, because most of it is covered by marsh and other kinds of luxuriant vegetation.

The two main rock types seem to be gabbro and green-stone, both belonging to the Støren group (Encl. 2).

As schistosity is well developed all over the area, few primary structures can be seen. For instance, the primary feature of the greenstone is unknown. Eventual pillow structures, finegrained dyke margins and other structures would not have survived the deformation.

Both the greenstone and the gabbro is rich in chlorite.

Within the greenstone, lenses of chert occur. In general it is rich in magnetite. The chert is observed in four localities and in the drill-holes. The thickness of the chert-layers goes from 20 cm up to 1 m.

In one old prospect, the chert is associated with a 7 m thick layer of massive pyrite ore.

In another prospect, the ore far north-east in the area, the chert is associated with a 1,5 m thick layer of massive pyrite-pyrrhotite ore with traces of chalcopyrite and a zone with disseminated pyrite.

The schistosity in the area is striking north-east/south-west. The dip alternates between northerly and southerly, but the observations are insufficient to suggest any theory about the regional structures.

To the north, the Støren group has a border to younger rocks of the Rinna group. These are mica schists and limestone. The limestone may indicate the border itself.

The hard rock chemical analysis show that the old prospects by the river Litletrøkna (Encl. 2) are rich in copper. None of the other analysing results show any unexpected values (see below):

Sample No.	Cu	Pb	Zn	Ni	Ag	Au (ppm)
Lo 1	171	84	434	44	1.2	
Lo 7	30	8	105	36		
Lo 10	6	17	75	75		
Lo 11	8	73	298	13		
Lo 13	6	10	32	21		
Tr 1	86	40	83	95		
2	12320	44	615	108	1.6	
3	23690	39	649	94	1.9	
K 72	6880	14	699	139	0.7	0.02

3. GEOPHYSICS

Helicopter survey (AB)

The results from the VLF-magnetometer - and GENIE measurements coincide well with the helicopter anomalies (Encl. 3).

See the interpretation of the curves (GGr)

The electromagnetic helicopter anomalies form four long lines with almost the same direction as the schistosity and layering.

On anomaly-line 1, there are no observations.

On anomaly-line 2, the only observation is an outcrop in the river Litletrøkna, far south-west in the area. One 0,5 m thick graphite-schist is exposed here.

On line 3 there is one outcrop observed. This is also in the river Litletrøkna, approx. 200 m from where it crosses the road. This is an old prospect in pyrrhotite - pyrite-ore with some chalcopyrite.

On anomaly-line 4, I have found three small procpects and one bigger (see Geology). Two of the small prospects are in magnetite-rich chert, one of them in contact with a thin massive pyrite layer. In the third small prospect there is no exposure.

The bigger prospect is in massive pyrite-pyrrhotite ore with traces of chalcopyrite.

In contact with the ore there is a magnetite-rich chert.

Ground geophysics (G.Gr.)

The HEM anomalies 3 and 4 were followed up by ground survey VLF MAG and GENIE. VLF and MAG was measured with 25 metres station spacing and 100 metres between the profiles.

At the HEM-map it is no EM-response at line 131 and 132 in the measured area (between line 2800 and 3200 at the VLF-map). All HEM-anomalies are of 1-3 grade anomalies. The same horizon shows also a magnetic high with a maximum at line 140 (VLF-line 1300).

VLF measurements

VLF transmitter: NAA
VLF receiver: Paulsen Instrument

The VLF maps, (Encl. 4, 5, 6 and 9) show good correlation to the HEM-map. Maps showing dip angel, quadrature and Frazer contoures are enclosed.

List of anomalies:

Line 500, 1075N - Line 1100, 950N

Depth to conductor 10-20 m
Conductivity-thickness product (σt) 10 mhos

Line 1200 - line 1400

No clear anomalies can be seen. On the Frazer contour map an anomaly can be followed at 850N.

Line 1500, 900N - line 2800, 800N

Long continuous conductor at depth 10-20 m
(σt about 20 mhos)

Line 2900, 800N - line 3300, 800N

The anomaly is of an irregular shape, but it is a rather thick bog in the area. The interpretation is that the anomaly from line 2800, 800N continues to the west.

Line 3400, 800N - 3800, 800N

Shallow anomaly, depth maximum 10 m

Line 3900, 650N - 4800, 850N

Long continuous, shallow anomaly which is dislocated from the anomaly at line 3800, 800N.

Magnetic measurements

Scintrex MP-2

The results of the magnetic measurements are shown in encl. 7 and 8. A magnetic high follows the EM anomalies.

At line 1300 and 1400 we find a complicated structure and a magnetic maximum. This corresponds with the helicopter measurements.

The dislocation between line 3800 and 3900 can also be seen at the magnetic contour map. At some stations very high γ-values are measured. They are caused by chert-lenses high in magnetite.

GENIE measurements (Encl. 10 and 11)

Two sub areas were selected to do a GENIE-survey. Transmitter - Receiver spacing was 100 metres, station spacing 50-25 metres. Frequency pairs 1:112/337, 2: 112/1012 and 3: 112/3037.

Sub-area, line 200 - line 1400

It is an anomaly going from line 500, 1025N to line 1300, 875N.

In the southern part there is a singel anomaly dipping S. The double anomalies at line 1000 to line 1300 are probably caused by folding. At line 1200 there are high positive values between 900-1000N which can be caused by conductive overburden. The anomalies show a rather large separation for all three frequency pairs and the conductor is rather poor.

GENIE measurements compared with VLF

It is a rather good correlation between GENIE and VLF at line 500 to line 1100. At line 1200 there are two responses at the GENIE but only a slight indication at the VLF. There are no GENIE responses at lines 400 and 1400. Encl. 9 is an example on VLF-EM filtering from variable spacing operators. The technique is described by D. Frazer, CIM Bulletin, Vol. 74, No. 828, pp 76-83.

Unfortunately the VLF-lines are too short to have a good depth calculation. The sections show, however, good correlation with the GENIE measurements.

Sub-area, line 3000 - line 4200

In this area it is an anomaly going from 3400, 650N to 4000, 700N. The response of the frequency pair 112/337 is low and it is a large separation between all three frequency pairs. The interpretation of the anomaly is a poor conductor at a depth of minimum 20 metres.

It is a strong VLF-anomaly at line 3400, 775N to line 3800, 775N, depth to conductor max 10 metres, $\sigma t = 9$. This anomaly, however, is situated too far north compared with the GENIE anomaly. At about 700N it is a weak VLF-anomaly which corresponds better with the GENIE anomaly.

Between line 3800 and line 4000 it is a dislocation of the VLF anomalies, but the GENIE anomaly continues at lines 3800, 3900 and 4000 without dislocation and dissappears at line 4200.

The magnetic picture is very similar to VLF with a dislocation between line 3800 and 4000.

4. DIAMOND DRILLLING

Besides geophysical and geological indications, the location of old prospects decided where we should put the drill-holes.

The holes were drilled in profile 1000V, dipping 45° north (Encl. 12).

In Dh 1, 10 cm massive pyrrhotite occurs by 8,75 metres. From 32,45 to 35,65 three other lenses with pyrite and/or pyrrhotite occur. Here there are traces of chalcopyrite, too.

Magnetite-rich, chertlike rock containing pyrite is seen by 51,05-51,15 metres.

Further down in this hole there are only traces of pyrrhotite.

There are three fracture zones in this hole. The rocks are in general schistose, soft and rich in chlorite and carbonate.

In Dh 2, the main mineralization zone lies at a depth of 102,1-103,15 metres. It is a black chert (possible) which is very rich in magnetite and contains garnets and veins of pyrrhotite.

Another, similar zone occurs by 75,8 metres. At 76,35 - 76,65 metres, there is a magnetite-rich chert containing some pyrite dissemination.

At 77,7-77,9 a chert without any sulphides occurs.

At 80,3-83,8 and 93,3-94,3 there are several zones containing biotite and magnetite.

At 102,1 - 103,15 there is a black chert containing garnets and magnetite.

In this drill-hole (Dh 2), there are two distinct fracture zones.

Both the greenstone and the gabbro is strongly schistose and laminated.

5. CONCLUSION

The elctromagnetic and magnetic anomalies in this area are caused by a magnetite-rich, chert-like rock, partly associated with massive pyrite-pyrrhotite ore or veins with these sulphides.

Though one of the elctromagnetic helicopter anomalies may be caused by graphite schist.

The helicopter anomalies far west in the area are not sufficiently investigated. The reason is the terrain. Steep hillsides down to narrow valleys made it impossible for the helicopter to keep constant distance to the ground.

The Lomunda area will not be further investigated for the time being.

Location of the Lomunda area

Scale: 1:50 000

Draw: ÅB

Trac: ÅB

Date: jan. 8

Orkla Industrier A.s
7332 LØKKEN VERK

No:

Enclosure no: 1

Gulf - Orkla Ventures

GEOLOGICAL MAP OF

THE LOMUNDA AREA

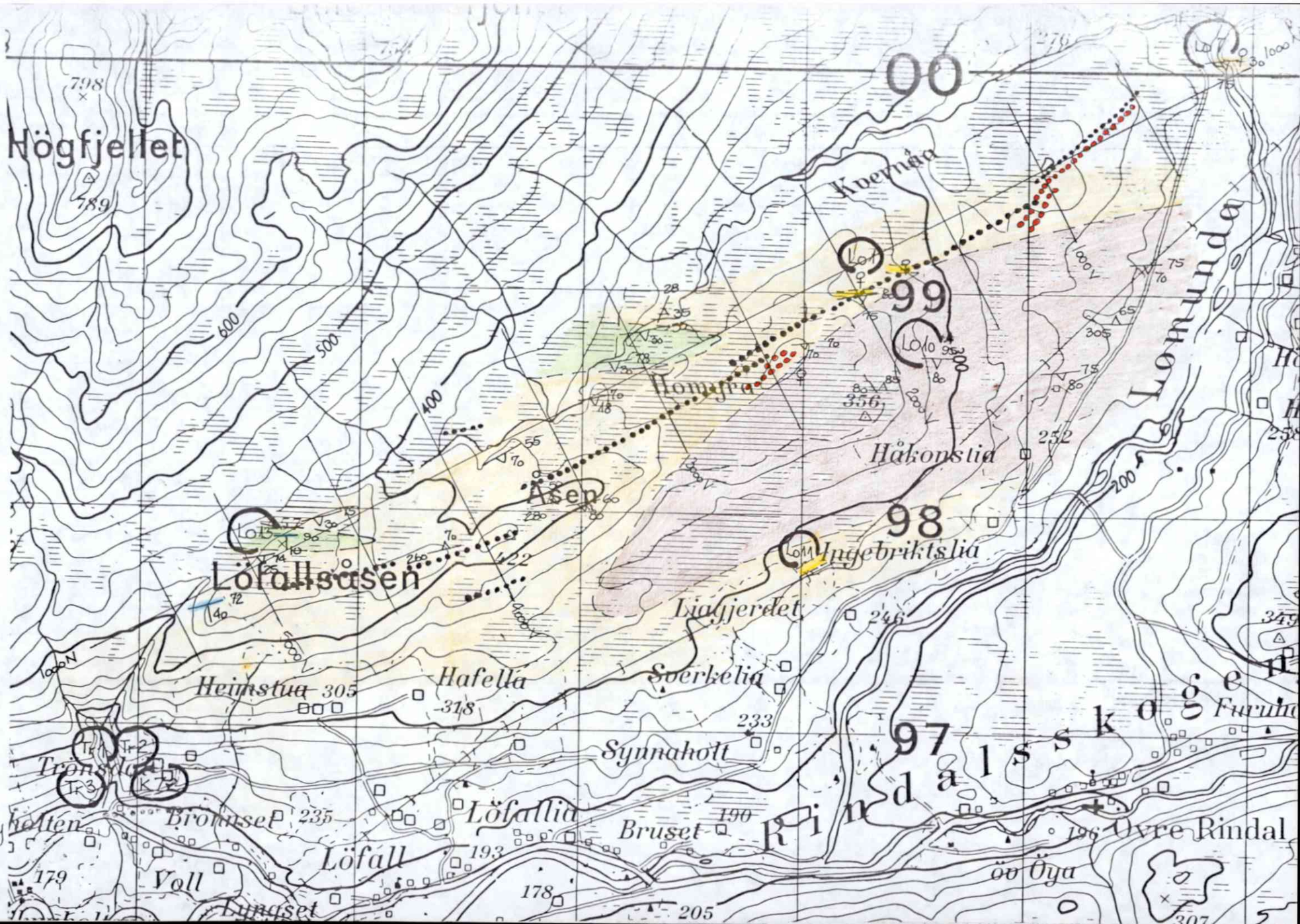
LEGEND

Støren group

- Greenstone, finegrained
- Gabbro
- Chert

Rinna group

- Mica schist
- Limestone
- Prospect
- Schistousity
- Layering
- Lithological border
- VLF / GENIE anomaly
- Locality no., hardrock geochemistry



Geological map of the Lomunda area	Scale 1:20000	Draw	RB
		TRAC	AM
		Date	Dec82
Orkla Industrier AS 7332 LØKKEN VERK Gulf - Orkla Venture	No		
	Enclosure no 2		
	Report no 16		

12 13 14 15 16

01

00

99

98

97

Smördalsfjellet

Högfjellet

Helicopter anomalies
magnetic
electromagnetic

Scale: 1:20.000

Draw: Å
Trac: Å
Date: Jan

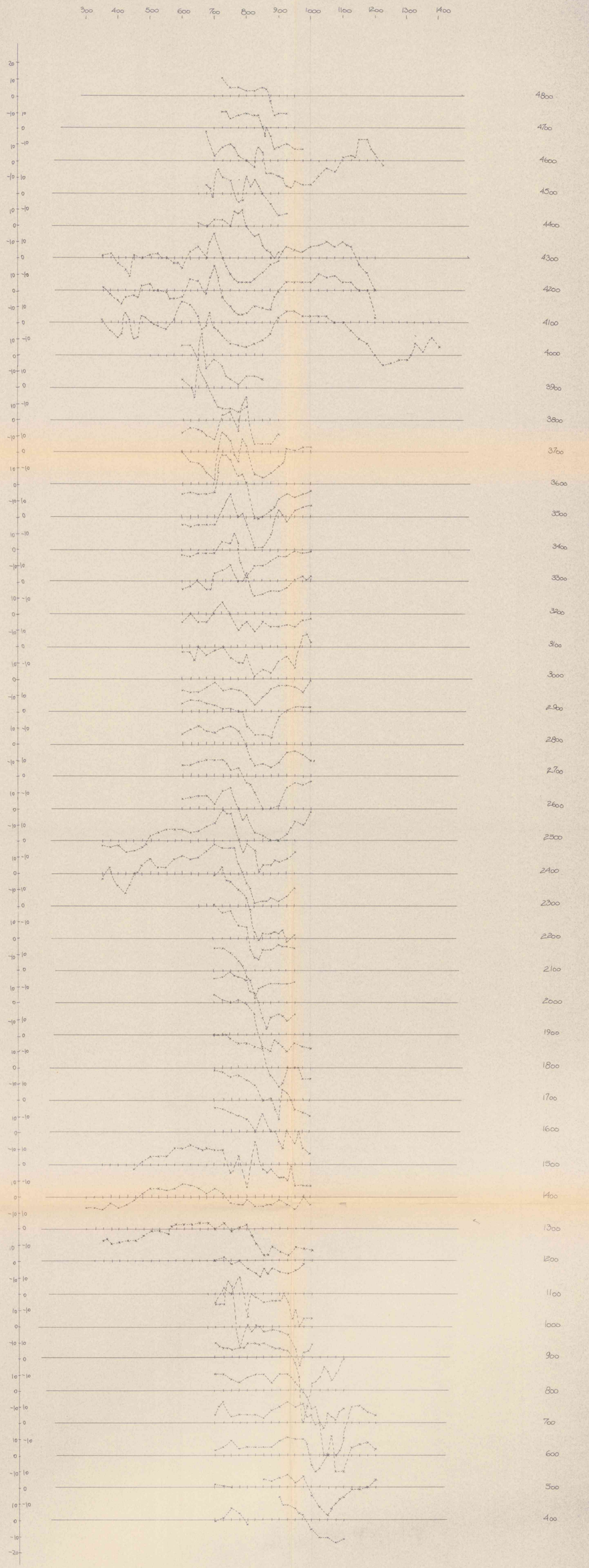
Orkla Industrier A s
7332 LØKKEN VERK

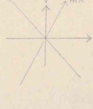
No:

Enclosure no: 3

Gulf - Orkla

LOMUNDA VLF-anomali map Dip angle	Scale:	Draw: AM Trac: AM
	1:3000	
Orkla Industrier A.S 7532 LØKKEN VERK Gulf - Orkla Venture	No: Gf1 #3	
	Encl. no 1 Report no 16	
	Date: Sept. 82	





LOMUNDA VLF- anomali map imaginary component	Scale 1:5000	Draw.: Trac.:	AM AM
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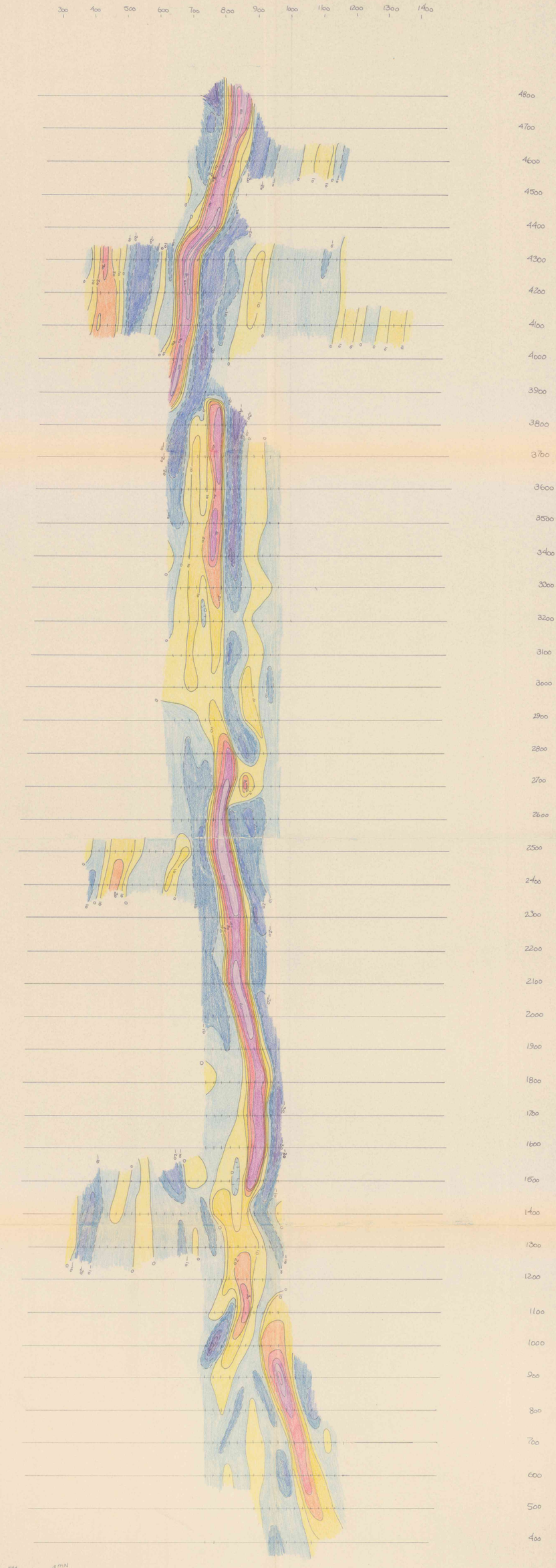
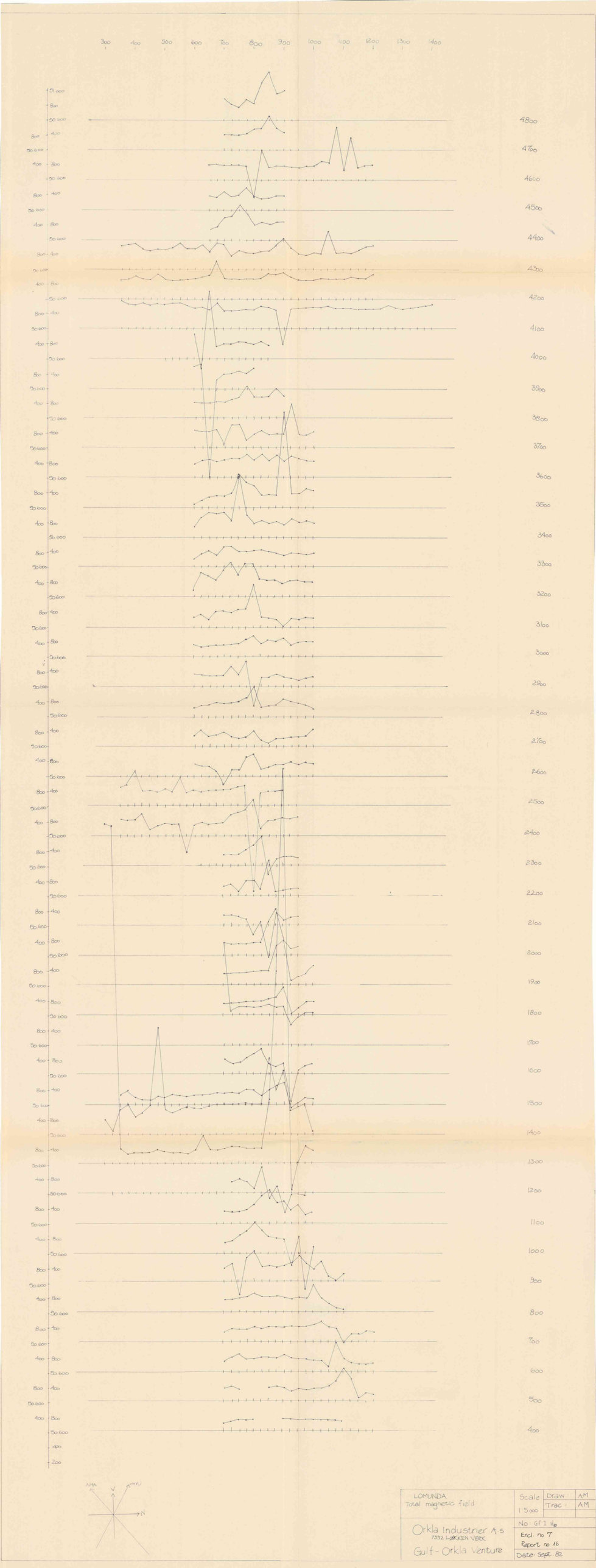


LOMUNDA
VLF - anomali map
Fraser contouring curves

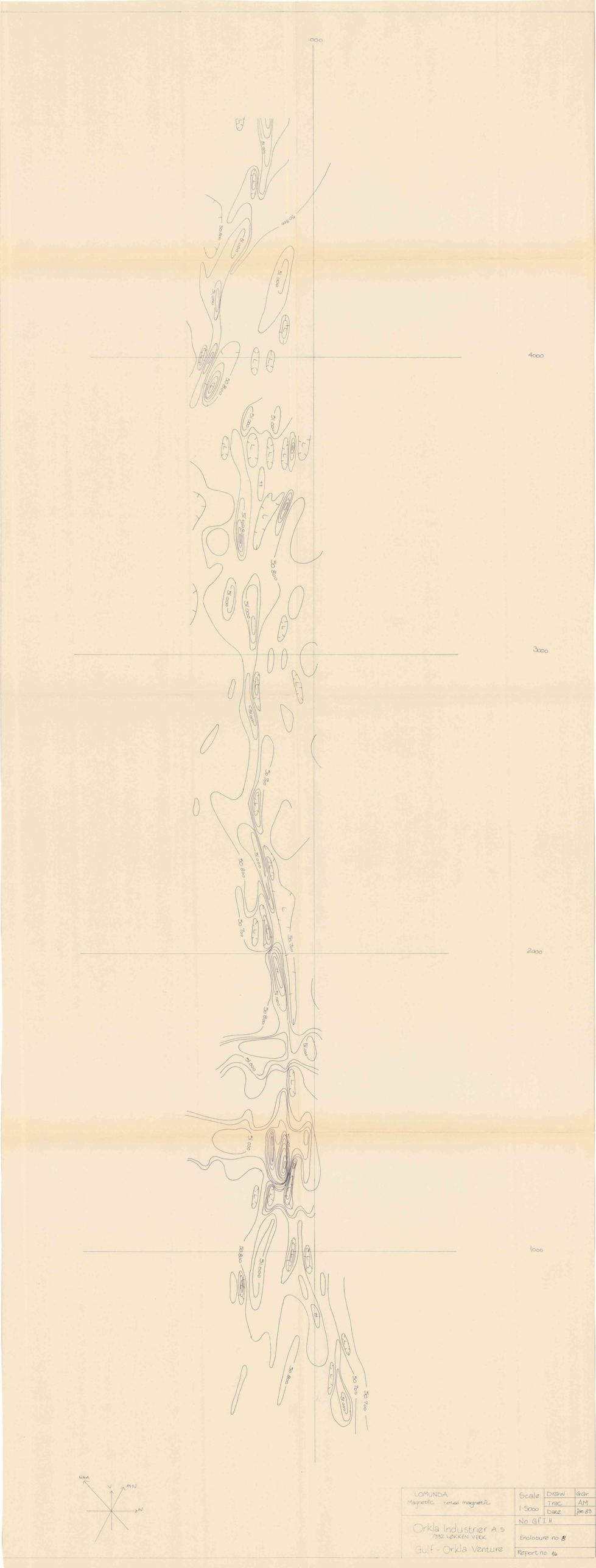
Scale	Draw.	Sgr
1:5000	Trac	AM

Orkla Industrier A.s
7332 LØKKEN VERK
Gulf - Orkla Venture

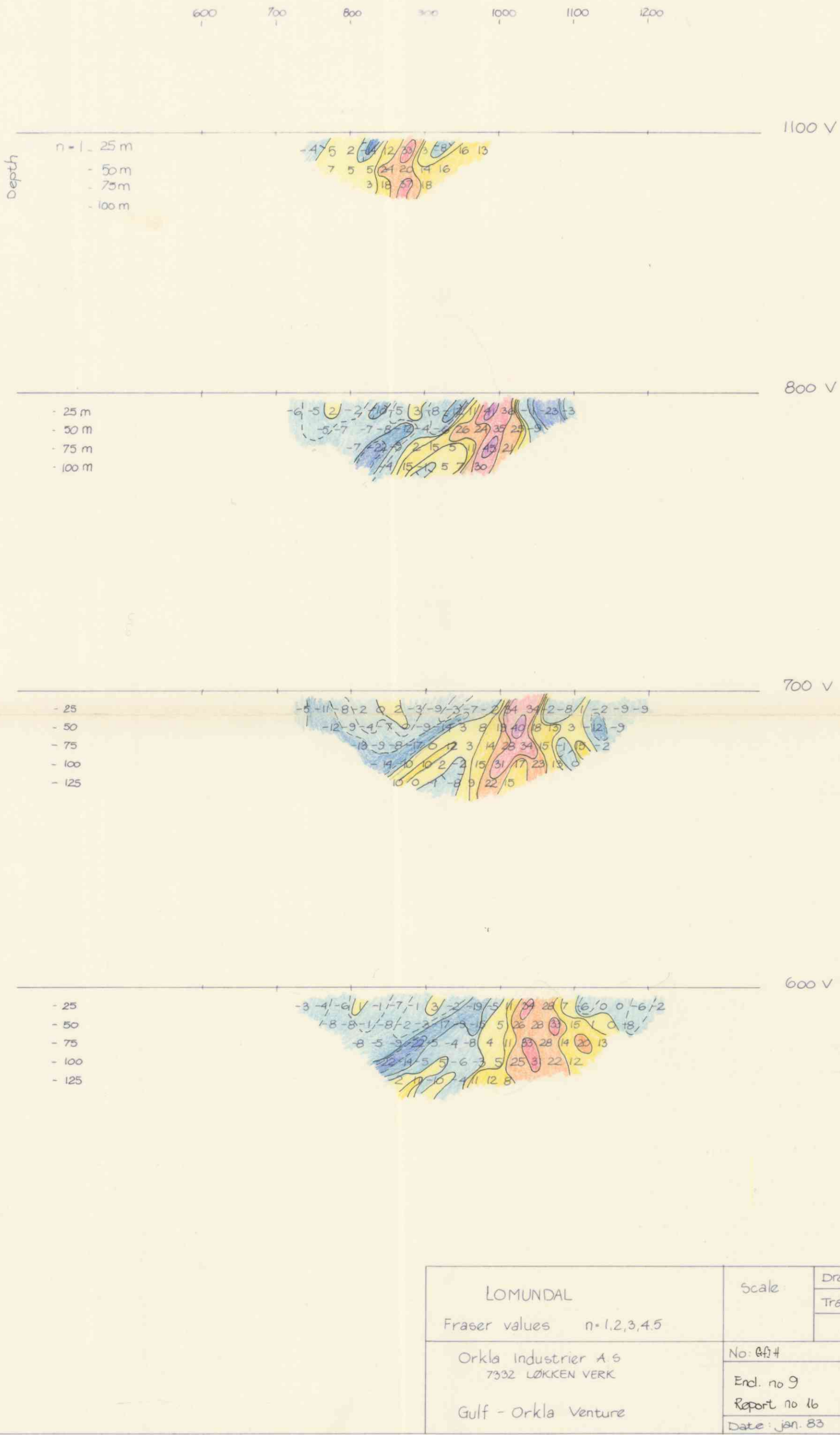
No GFI #6
No: 6
Report no 6
Date: nov 82



LOMUNDA Total magnetic field	Scale 1:5.000	Drawn Trac.	AM AM
Orkla Industrier A.s 7332 LØKKEN VERK Gulf - Orkla Venture	No: GF 1 16 Encl. no 7 Report no 16 Date: Sept. 82		



LOMUNDA Magnetic - total magnetic	Scale 1:5000	Drsw.	GGr
		Trac.	AM
		Date	Jan. 89
Orkla Industrier A.S 7332 LØKKEN VERK	No GFIH		
Gulf - Orkla Venture	Enclosure no 8		
	Report no 16		



LOMUNDAL Fraser values n = 1,2,3,4,5	Scale:	Draw:	TV
		Trac:	AM
Orkla Industrier A.S 7332 LØKKEN VERK Gulf - Orkla Venture	No: Gf) 4		
	End. no 9 Report no 16		
	Date: jan. 83		

600 700 800 900 1000 1100 1200

1400

1300

1200

1100

1000

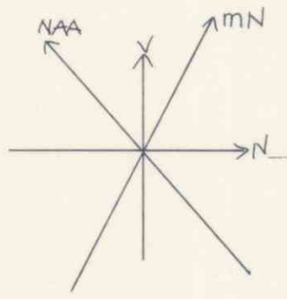
800

600

500

400

200



LOMUNDA

Genie - separation 100 m

1: — 2: x···x···x 3: o--o--o

Orkla Industrier A.S
7332 LØKKEN VERK

Gulf - Orkla Venture

Scale:

Draw: AM

Trac: AM

No: Gf I H8

Encl. no 10

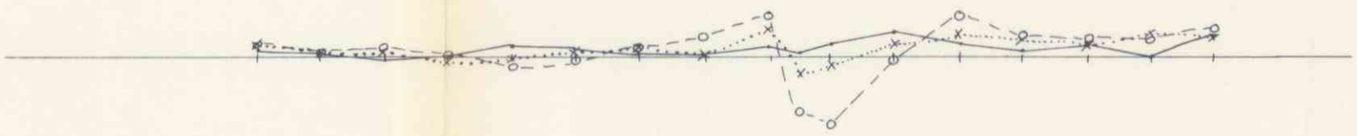
Report no 16

Date: nov 82

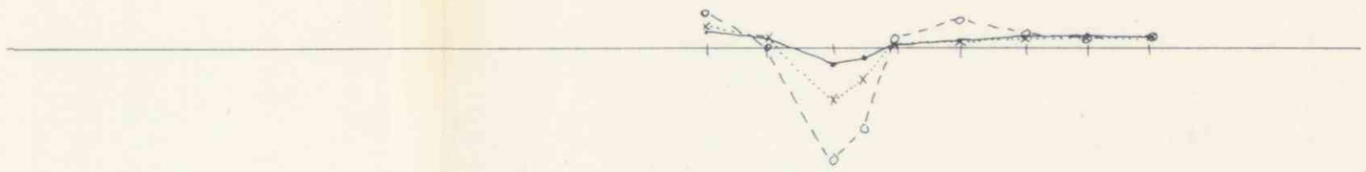
200N 300N 400N 500N 600N 700N 800N 900N 1000

4200V

4000 V

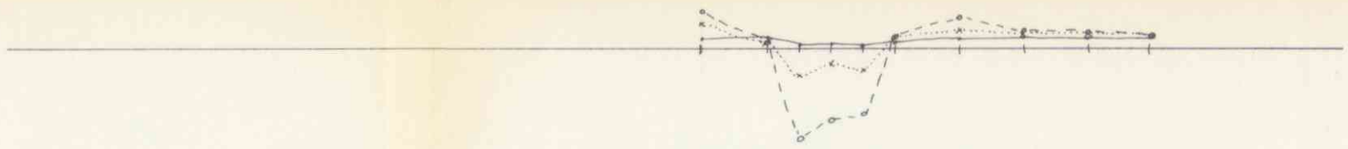


3900 V



3800V

3600V

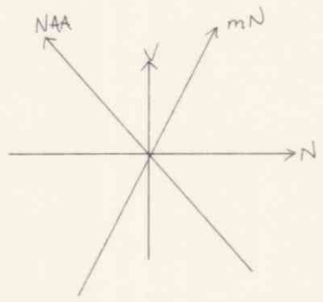


3400V

3200V

3000V

30 20 10 0 -10 -20



LOMUNDA Genie - separation 100 m 1 2 3	Scale:	Draw:	AM
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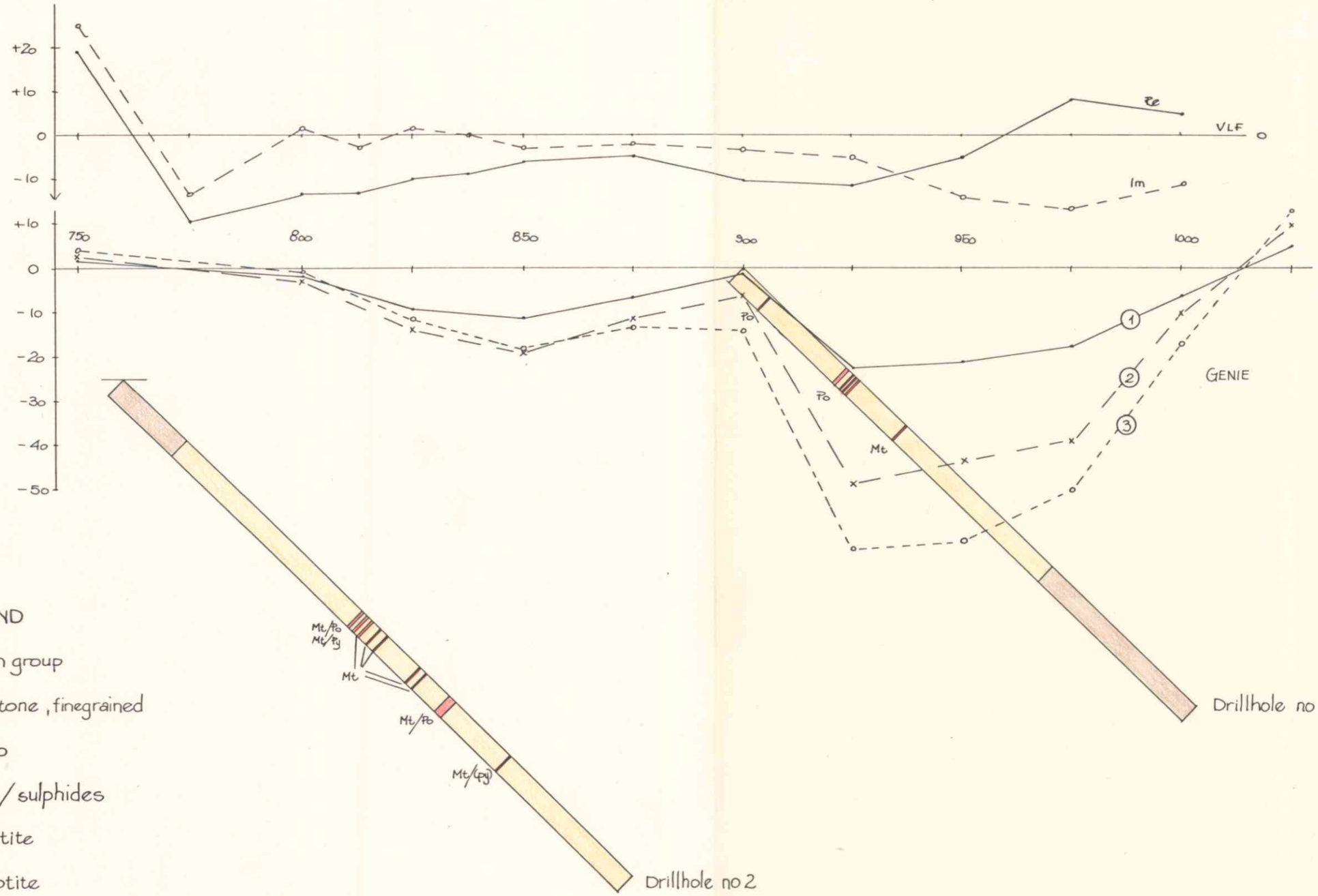
	Report no 16		



LEGEND

Støren group

Greenstone, finegrained

Gabbro

Chert / sulphides

Mt Magnetite

Po Pyrrhotite

Py Pyrite

GENIE : 1: Frequency pair 112/337
2: Frequency pair 112/1012
3: Frequency pair 112/3037

LOMUNDA PROFILE 1000 Drill-holes, genie- and VLF-curves	Scale: 1:1000	Draw:	GGr.ÅB
		Trac:	AM
		Date:	feb 83
Orkla Industrier A.S 7332 LØKKEN VERK Gulf - Orkla Venture	No:		
	Enclosure no: 12		
	Report no: 16		