



Bergvesenet rapport nr 3246	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering
Kommer fra ..arkiv Bergverksselskapet	Ekstern rapport nr Suomen Malmi 7506	Oversendt fra	Fortrolig pga	Fortrolig fra dato:
Tittel VLF- magnetic Measurments in Mofjellet in Spring 1975				
Forfatter Pekka Mikkola		Dato År 07.11 1975	Bedrift (oppdragsgiver og/eller oppdragstaker) Bergverksselskapet Nord-Norge A/S	
Kommune Rana	Fylke Nordland	Bergdistrikt Nordlandske	1: 50 000 kartblad 19271 20274	1: 250 000 kartblad Mo i Rana
Fagområde Geofysikk	Dokument type		Forekomster (forekomst, gruvefelt, undersøkelsesfelt) Mofjellet	
Råstoffgruppe Malm/metall	Råstofftype Pb Zn			
Sammendrag, innholdsfortegnelse eller innholdsbeskrivelse Innhold i rapport: 1. Introduction 2. VLF Measurments 3. Magnetic Measurments 4. Summasy and Recommendations				

RDL. BERGM. FMBET.

WNT.

240/76

4.3.

23 - 83

VLF-MAGNETIC MEASUREMENTS IN MOFJELLET
IN SPRING 1975

SUOMEN MALMI OY

1975-11-07

PEKKA MIKKOLA



VLF-Magnetic Measurements in Mofjellet in Spring 1975

1. Introduction
2. VLF Measurements
3. Magnetic Measurements
4. Summary and Recommendations

Appendices

- | | |
|-------------|----------------------------------|
| 1 | List of Conductors |
| 2 | Interpretation Map |
| 3a,b - 6a,b | VLF R- and I- Maps |
| 7 - 10 | Magnetic Maps |
| 11 - 18 | Magnetic Interpretation Profiles |

1. INTRODUCTION

According to the contract between Nord Norge Bergverksselskap A/S and Geobor A/S, Suomen Malmi Oy carried out VLF-magnetic measurements (56 line-kilometers) and staked out lines (35 kilometers) in the neighbourhood of the Mofjellet mine in Mo-i-Rana during the period 1975-04-21....05-24. The area covered by the survey was 12 km². The measurements were similar to those made by Suomen Malmi Oy for Bleikvassli Gruber A/S (e.g. Report 23-53, 1975-10-17).

The purpose of the VLF measurements was to locate bedrock conductors on regional scale in order to ascertain geological structures in the surroundings of the mine and to spot possible sulfide mineralizations. The magnetic measurements were made to provide additional information for the interpretation of VLF anomalies.

The results of the measurements are portrayed through contour maps on scale 1:10000. The interpretation of VLF anomalies has mainly been based on the real component - imaginary component ratio. Magnetic anomalies have been interpreted by a curve-fitting technique using platelike models. The most important VLF anomalies have been listed in the appendix 1. The results of the interpretations are given in the appendix 2 in the form of interpretation map.

The field crew consisted of a foreman, three observers and a local hired hand. The line spacing was 200 meters and the distance between adjacent points along lines was 20 meters in the case of VLF measurements and 10 meters in the case of magnetic measurements.

2. VLF MEASUREMENTS

A Ronka EM-16 receiver made by Geonics Ltd. was used to detect signals transmitted by the stations FUG (15.1 kHz) in France and NAA (17.8 kHz) in USA. The tilt-angle of the magnetic component of the electromagnetic field (real component) and a quantity proportional to the phase difference between primary and secondary fields (imaginary component) were measured.

The observations have been Fraser-filtered. By transforming points of inflection to anomalous maxima this filtering process reduces effects of topography and yields results which can be readily visualized as contours. The filtered VLF observations have been contoured on scale 1:5000 conforming to the scheme of the national economic maps. The maps have been optically reduced to scale 1:10000 and appended to this report (Appendices 3a,b - 6a,b).

Electric lines disturbed the measurements. The most troublesome were the lines parallel to the geological strike in the middle and western parts of the surveyed area. Anyway, the results point out several clear-cut anomalous zones, which are rather long in the middle and southwestern parts of the measured area. The north-eastern part contains definitely smallest number of conductors.

Conductors are generally rather straight and strike in EW direction. The conductors 12, 13 and 16 are exceptions. The conductors have been classified mainly on the basis of the real component - imaginary component ratio to poor, moderate and good ones. Most conductors are poor or moderate. The conductors 5, 7, 9 b, 11 and 12 are good. It is difficult to interpret the dips of the conductors from the VLF observations. In theory, however, horizontal beds do not cause VLF anomalies.

The strikes of the geological conductors appear to be the same in the VLF and magnetic maps. However, there is no clear pattern of magnetized zones in relation to the conductors. Here a conductor may be magnetized, there no magnetic associated with the same conductor (e.g. no. 5).

The most outstanding VLF anomalies have been listed and described in the appendix 1. Moreover, the same conductors, together with the results of the magnetic interpretations, appear in the appendix 2.

3. MAGNETIC MEASUREMENTS

The survey was carried out using a MP-2 proton magnetometer made by Scintrex Ltd. This magnetometer can be read with an accuracy

of gamma. The diurnal variations of the geomagnetic field were eliminated by base lines. The smoothed results have been contoured on scale 1:5000. The contour maps have been optically reduced to scale 1:10000 and appended to this report (Appendices 7 - 10).

The surveyed area is very weakly magnetized. Maximum anomalies are about 1000 gammas. Most anomalies are about 50 - 100 gammas. However, the anomalous zones are again sharply outlined. The most intensively magnetized formations appear in the southeastern corner, where plenty of VLF conductors are also encountered. The magnetic and VLF maps indicate that the conductors are not magnetized according to any definite pattern.

In order to obtain quantitative information concerning the magnetized formations, selected magnetic anomalies have been interpreted by fitting curves. The interpretation models were constructed of two-dimensional plates with following variable parameters: horizontal location (X, m), dip ($FII, 1^g$), depth to the upper surface (Z, m), width (D, m) and effective susceptibility ($K, 10^{-6}$ cgs). The results of the interpretations are given in the form of interpretation profiles (Appendices 11 - 18) and interpretation map (Appendix 2). Due to the disregard of possible remanent magnetization and the simplicity of models the results of the interpretations are more or less approximate. The average inclination to north of the measuring profiles (16^g) has been taken into consideration in the interpretation by subtracting it from the inclination of the geomagnetic field. Correspondingly the same angle (16^g) has to be added to the dip values obtained in the interpretation.

4. SUMMARY AND RECOMMENDATIONS

The VLF-magnetic measurements have yielded additional information about conductors and geological structures in the surveyed area. However, on the basis of this geophysical information alone it is impossible to ascertain whether certain conductors are mineralizations, shear zones or graphites. Detailed geological mapping is

recommended as the first step in determining the types of the conductors. Interesting objects may then be investigated using the IP method. If good conductors are encountered on outcrops or in drill-holes, accurate information concerning them can be obtained through CP measurements.

Espoo 1975-11-07

SUOMEN MALMI OY

Geophysical Department



Pekka Mikkola

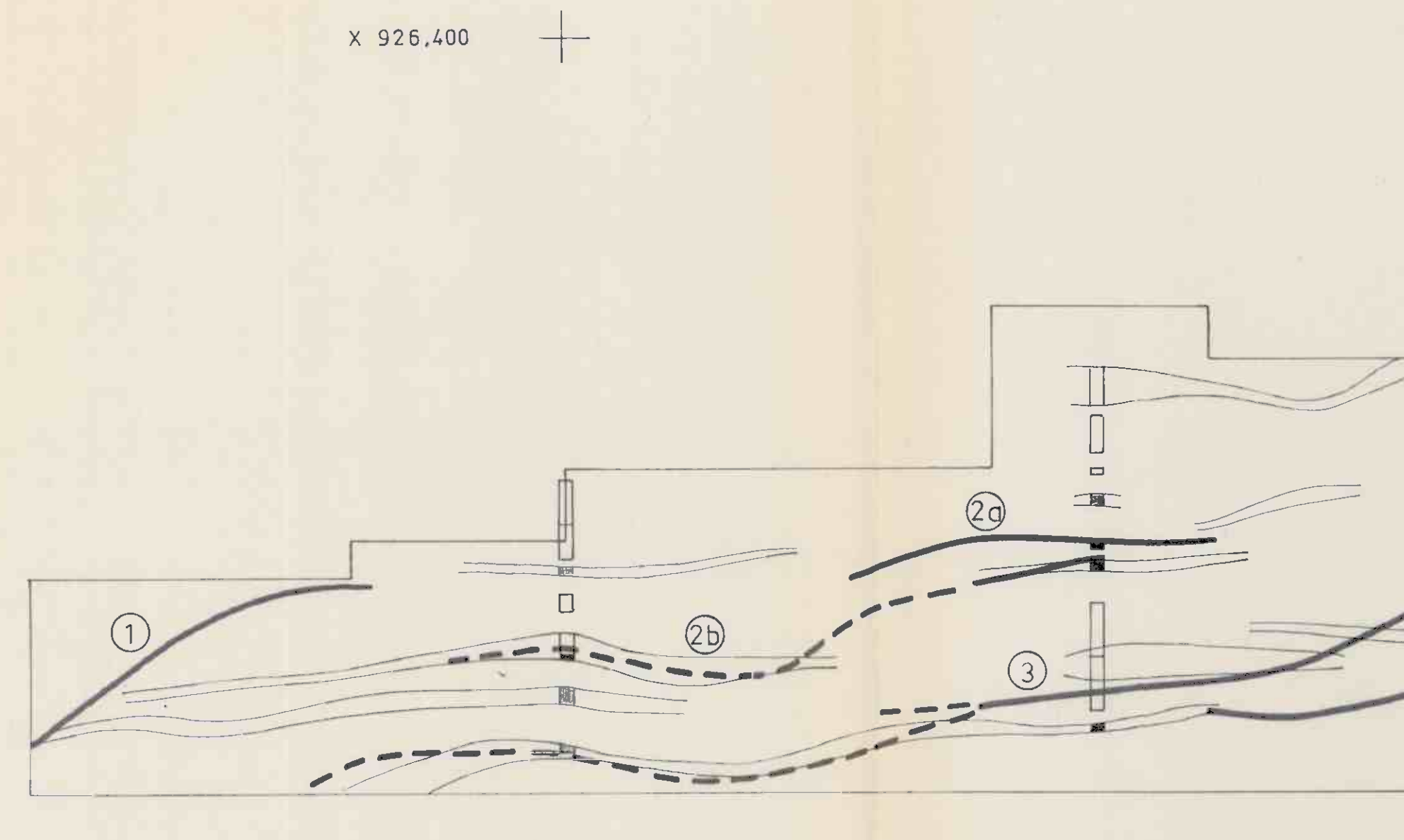
Geophysicist

LIST OF MAJOR ANOMALIES

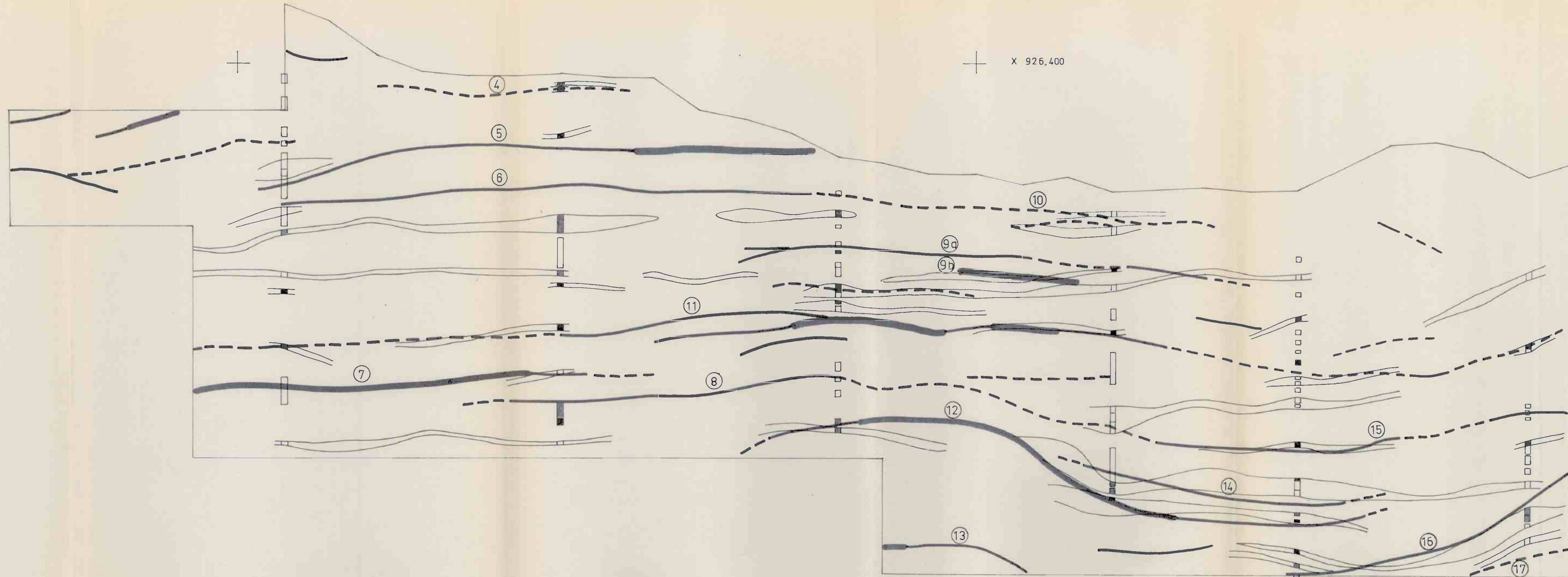
No./y-prof.	R _f (%)	I _f (%)	T (Y)	length (km)	Remarks
1/40.6	+ 33	+ 6	+ 143	> 0.7	Moderate conductor in the corner of the area. Outside magnetic anomalies.
2a/42.4	+ 36	+ 3	+ 118	0.7	Short moderate conductor situated north of a clearly magnetized zone.
2b/41.8	+ 28	+ 37	+ 200	1.2	Poor conductor connected to a magnetic formation.
3/42.8	+ 18	- 11	+ 34	> 2.0	Quite weak anomaly indicating conductivity varying from poor to moderate. Situated partly on the northern edge of a magnetized zone.
4/46.2	+ 94	+ 67	+ 24	1.0	Poor conductor situated outside magnetic anomalies except the northern end.
5/45.8	+ 74	+ 29	+ 54	> 2.5	Conductivity varies between moderate and good. Connected to a small magnetic anomaly in the eastern end. This indicates that the anomaly-source is in the bedrock. On the other hand the anomaly is located on the boarder of quarternary overburden.
6/46.4	+ 42	+ 9	- 26	4.0	Conductivity between poor and moderate. Continues as no. 10 in the east. It is situated outside magnetic anomalies.
7/45.4	+ 180	- 14	+ 6	> 2.0	The strongest anomaly in the area. Mainly an excellent conductor. It

No./y-prof.	R _f (%)	I _f (%)	T (γ)	length (km)	Remarks
7/45.4	+ 180	- 14	+ 6	> 2.0	It is situated 50 meters north of a weakly magnetized zone.
8/46.6	+ 78	+ 34	+ 40	> 4.5	Moderate conductor which turns to poor towards the eastern end and continues as no. 15. Situated on the northern edge of a weakly magnetized zone.
9a/47.4	+ 102	+ 11	+ 28	2.2	Moderate conductor connected to a magnetic anomaly in the east.
9b/48.2	+ 47	- 2	+ 35	0.5	Good short conductor which is connected to a clearly magnetized zone
10/48.6	+ 78	+ 24	- 7	4.0	Poor conductor which is the eastern continuation of anomaly no. 6. Situated partly between two magnetic zones.
11/47.8	+ 64	+ 22	+ 40	> 6.0	Conductivity varies from good to poor. Clearly magnetized at certain places. Runs through the area.
12/48.8	+ 176	+ 7	+ 130	> 2.8	Conductivity mainly excellent. A dominant conductor connected to relatively strong magnetization. Unusual strike-direction.
13/47.8	+ 51	+ 5	+ 63	> 0.7	Moderate conductor at the corner of the area outside magnetic anomalies.
14/48.8	+ 79	- 32	+1.127	1.5	Moderate conductor parallel to no. 12. Situated between two magnetic zones.

No./y- prof.	R_f (%)	I_f (%)	T (γ)	length (km)	Remarks
15/49.4	+ 61	+ 31	+ 401	> 4.5	Moderate conductor connected to no. 8 by a poorly conducting part. Clearly magnetized.
16/50.0	+ 81	+ 43	+ 799	> 1.3	Moderate conductor running through the corner of the area. Situated partly at the northern edge of a relatively strongly magnetized zone.
17/50.4	+ 55	+ 37	+ 58	> 0.5	Poor conductor in the corner of the area. Between magnetic zones.



X 924,000
Y 41,600



Y 44,800

X 924,000
Y 48,000

Magnetic zones

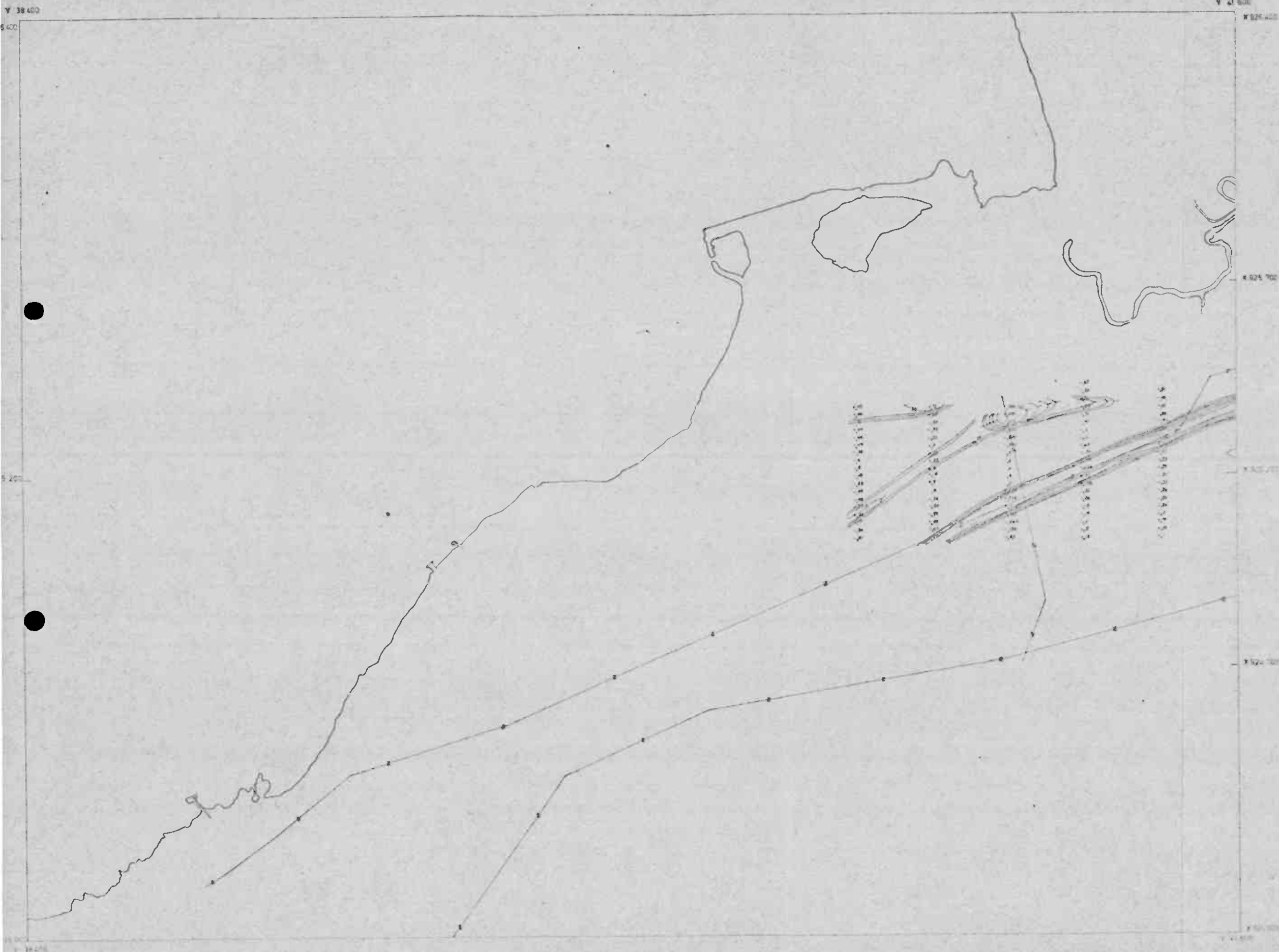
- $K \geq 2000 \times 10^{-6}$ cgs
- $1000 \leq K < 2000 \times 10^{-6}$ cgs
- $K < 1000 \times 10^{-6}$ cgs

Conductive zones

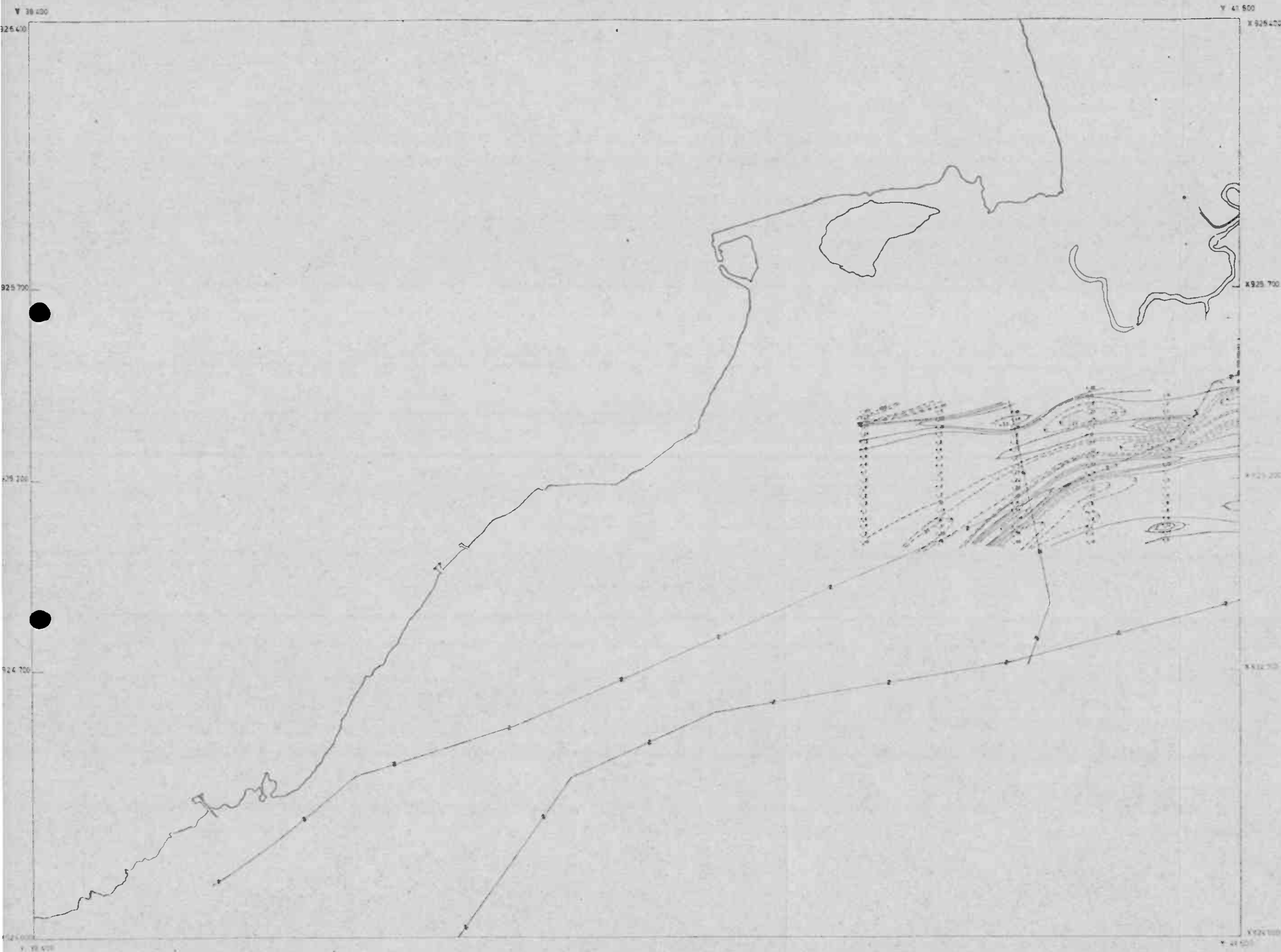
- good conductivity
- moderate " "
- poor " "

⑫ etc anomalies referred in the text and App.1

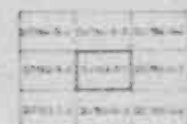
SUOMEN MALMI OY	1:10 000	meas.		
		draw.	SM	11.75
		insp.	PM	11.75
Interpretation map				
MOFJELLET				



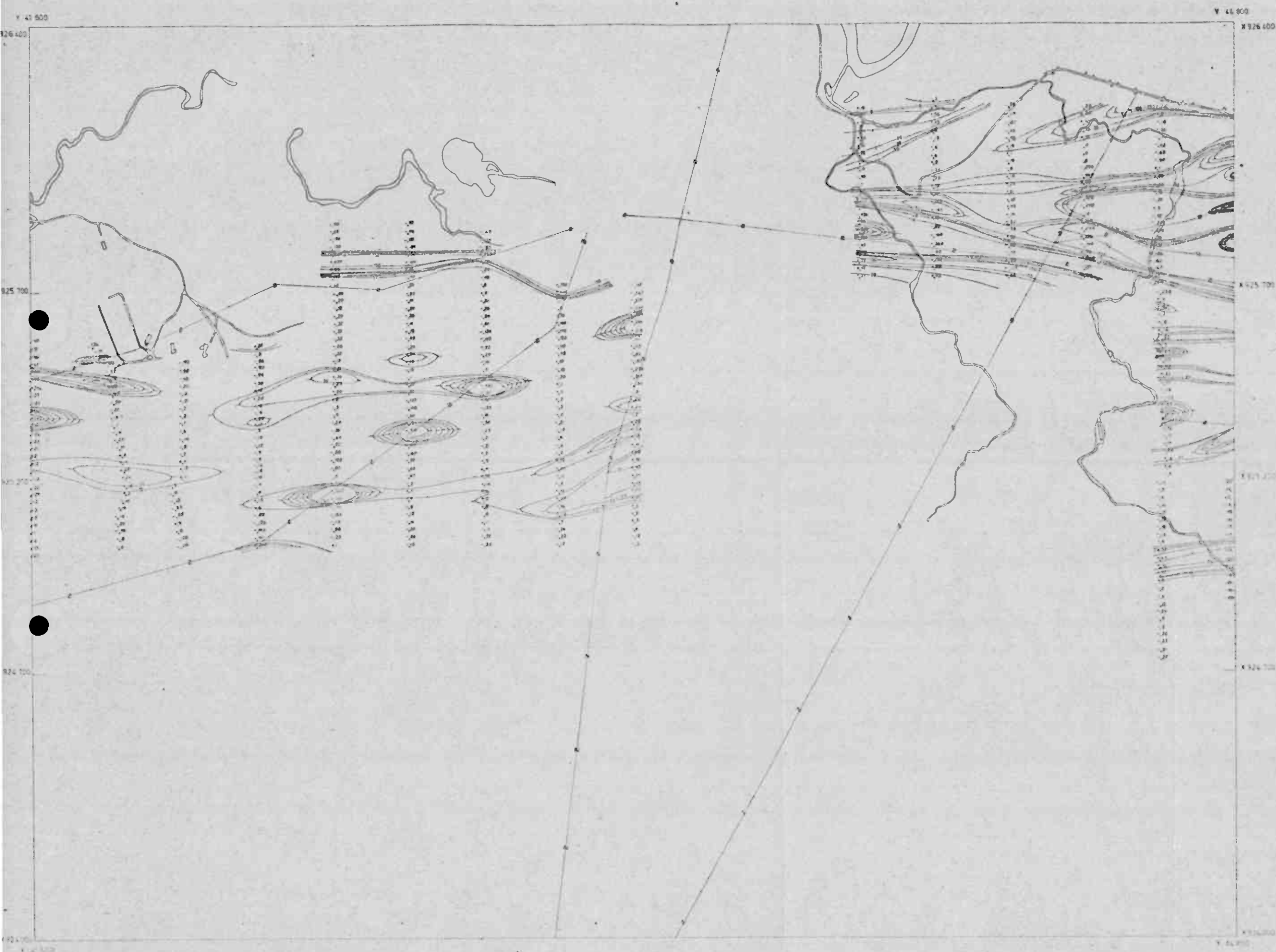
Contours: 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, 370, 375, 380, 385, 390, 395, 400, 405, 410, 415, 420, 425, 430, 435, 440, 445, 450, 455, 460, 465, 470, 475, 480, 485, 490, 495, 500, 505, 510, 515, 520, 525, 530, 535, 540, 545, 550, 555, 560, 565, 570, 575, 580, 585, 590, 595, 600, 605, 610, 615, 620, 625, 630, 635, 640, 645, 650, 655, 660, 665, 670, 675, 680, 685, 690, 695, 700, 705, 710, 715, 720, 725, 730, 735, 740, 745, 750, 755, 760, 765, 770, 775, 780, 785, 790, 795, 800, 805, 810, 815, 820, 825, 830, 835, 840, 845, 850, 855, 860, 865, 870, 875, 880, 885, 890, 895, 900, 905, 910, 915, 920, 925, 930, 935, 940, 945, 950, 955, 960, 965, 970, 975, 980, 985, 990, 995, 1000, 1005, 1010, 1015, 1020, 1025, 1030, 1035, 1040, 1045, 1050, 1055, 1060, 1065, 1070, 1075, 1080, 1085, 1090, 1095, 1100, 1105, 1110, 1115, 1120, 1125, 1130, 1135, 1140, 1145, 1150, 1155, 1160, 1165, 1170, 1175, 1180, 1185, 1190, 1195, 1200, 1205, 1210, 1215, 1220, 1225, 1230, 1235, 1240, 1245, 1250, 1255, 1260, 1265, 1270, 1275, 1280, 1285, 1290, 1295, 1300, 1305, 1310, 1315, 1320, 1325, 1330, 1335, 1340, 1345, 1350, 1355, 1360, 1365, 1370, 1375, 1380, 1385, 1390, 1395, 1400, 1405, 1410, 1415, 1420, 1425, 1430, 1435, 1440, 1445, 1450, 1455, 1460, 1465, 1470, 1475, 1480, 1485, 1490, 1495, 1500, 1505, 1510, 1515, 1520, 1525, 1530, 1535, 1540, 1545, 1550, 1555, 1560, 1565, 1570, 1575, 1580, 1585, 1590, 1595, 1600, 1605, 1610, 1615, 1620, 1625, 1630, 1635, 1640, 1645, 1650, 1655, 1660, 1665, 1670, 1675, 1680, 1685, 1690, 1695, 1700, 1705, 1710, 1715, 1720, 1725, 1730, 1735, 1740, 1745, 1750, 1755, 1760, 1765, 1770, 1775, 1780, 1785, 1790, 1795, 1800, 1805, 1810, 1815, 1820, 1825, 1830, 1835, 1840, 1845, 1850, 1855, 1860, 1865, 1870, 1875, 1880, 1885, 1890, 1895, 1900, 1905, 1910, 1915, 1920, 1925, 1930, 1935, 1940, 1945, 1950, 1955, 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995, 2000, 2005, 2010, 2015, 2020, 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100, 2105, 2110, 2115, 2120, 2125, 2130, 2135, 2140, 2145, 2150, 2155, 2160, 2165, 2170, 2175, 2180, 2185, 2190, 2195, 2200, 2205, 2210, 2215, 2220, 2225, 2230, 2235, 2240, 2245, 2250, 2255, 2260, 2265, 2270, 2275, 2280, 2285, 2290, 2295, 2300, 2305, 2310, 2315, 2320, 2325, 2330, 2335, 2340, 2345, 2350, 2355, 2360, 2365, 2370, 2375, 2380, 2385, 2390, 2395, 2400, 2405, 2410, 2415, 2420, 2425, 2430, 2435, 2440, 2445, 2450, 2455, 2460, 2465, 2470, 2475, 2480, 2485, 2490, 2495, 2500, 2505, 2510, 2515, 2520, 2525, 2530, 2535, 2540, 2545, 2550, 2555, 2560, 2565, 2570, 2575, 2580, 2585, 2590, 2595, 2600, 2605, 2610, 2615, 2620, 2625, 2630, 2635, 2640, 2645, 2650, 2655, 2660, 2665, 2670, 2675, 2680, 2685, 2690, 2695, 2700, 2705, 2710, 2715, 2720, 2725, 2730, 2735, 2740, 2745, 2750, 2755, 2760, 2765, 2770, 2775, 2780, 2785, 2790, 2795, 2800, 2805, 2810, 2815, 2820, 2825, 2830, 2835, 2840, 2845, 2850, 2855, 2860, 2865, 2870, 2875, 2880, 2885, 2890, 2895, 2900, 2905, 2910, 2915, 2920, 2925, 2930, 2935, 2940, 2945, 2950, 2955, 2960, 2965, 2970, 2975, 2980, 2985, 2990, 2995, 3000, 3005, 3010, 3015, 3020, 3025, 3030, 3035, 3040, 3045, 3050, 3055, 3060, 3065, 3070, 3075, 3080, 3085, 3090, 3095, 3100, 3105, 3110, 3115, 3120, 3125, 3130, 3135, 3140, 3145, 3150, 3155, 3160, 3165, 3170, 3175, 3180, 3185, 3190, 3195, 3200, 3205, 3210, 3215, 3220, 3225, 3230, 3235, 3240, 3245, 3250, 3255, 3260, 3265, 3270, 3275, 3280, 3285, 3290, 3295, 3300, 3305, 3310, 3315, 3320, 3325, 3330, 3335, 3340, 3345, 3350, 3355, 3360, 3365, 3370, 3375, 3380, 3385, 3390, 3395, 3400, 3405, 3410, 3415, 3420, 3425, 3430, 3435, 3440, 3445, 3450, 3455, 3460, 3465, 3470, 3475, 3480, 3485, 3490, 3495, 3500, 3505, 3510, 3515, 3520, 3525, 3530, 3535, 3540, 3545, 3550, 3555, 3560, 3565, 3570, 3575, 3580, 3585, 3590, 3595, 3600, 3605, 3610, 3615, 3620, 3625, 3630, 3635, 3640, 3645, 3650, 3655, 3660, 3665, 3670, 3675, 3680, 3685, 3690, 3695, 3700, 3705, 3710, 3715, 3720, 3725, 3730, 3735, 3740, 3745, 3750, 3755, 3760, 3765, 3770, 3775, 3780, 3785, 3790, 3795, 3800, 3805, 3810, 3815, 3820, 3825, 3830, 3835, 3840, 3845, 3850, 3855, 3860, 3865, 3870, 3875, 3880, 3885, 3890, 3895, 3900, 3905, 3910, 3915, 3920, 3925, 3930, 3935, 3940, 3945, 3950, 3955, 3960, 3965, 3970, 3975, 3980, 3985, 3990, 3995, 4000, 4005, 4010, 4015, 4020, 4025, 4030, 4035, 4040, 4045, 4050, 4055, 4060, 4065, 4070, 4075, 4080, 4085, 4090, 4095, 4100, 4105, 4110, 4115, 4120, 4125, 4130, 4135, 4140, 4145, 4150, 4155, 4160, 4165, 4170, 4175, 4180, 4185, 4190, 4195, 4200, 4205, 4210, 4215, 4220, 4225, 4230, 4235, 4240, 4245, 4250, 4255, 4260, 4265, 4270, 4275, 4280, 4285, 4290, 4295, 4300, 4305, 4310, 4315, 4320, 4325, 4330, 4335, 4340, 4345, 4350, 4355, 4360, 4365, 4370, 4375, 4380, 4385, 4390, 4395, 4400, 4405, 4410, 4415, 4420, 4425, 4430, 4435, 4440, 4445, 4450, 4455, 4460, 4465, 4470, 4475, 4480, 4485, 4490, 4495, 4500, 4505, 4510, 4515, 4520, 4525, 4530, 4535, 4540, 4545, 4550, 4555, 4560, 4565, 4570, 4575, 4580, 4585, 4590, 4595, 4600, 4605, 4610, 4615, 4620, 4625, 4630, 4635, 4640, 4645, 4650, 4655, 4660, 4665, 4670, 4675, 4680, 4685, 4690, 4695, 4700, 4705, 4710, 4715, 4720, 4725, 4730, 4735, 4740, 4745, 4750, 4755, 4760, 4765, 4770, 4775, 4780, 4785, 4790, 4795, 4800, 4805, 4810, 4815, 4820, 4825, 4830, 4835, 4840, 4845, 4850, 4855, 4860, 4865, 4870, 4875, 4880, 4885, 4890, 4895, 4900, 4905, 4910, 4915, 4920, 4925, 4930, 4935, 4940, 4945, 4950, 4955, 4960, 4965, 4970, 4975, 4980, 4985, 4990, 4995, 5000, 5005, 5010, 5015, 5020, 5025, 5030, 5035, 5040, 5045, 5050, 5055, 5060, 5065, 5070, 5075, 5080, 5085, 5090, 5095, 5100, 5105, 5110, 5115, 5120, 5125, 5130, 5135, 5140, 5145, 5150, 5155, 5160, 5165, 5170, 5175, 5180, 5185, 5190, 5195, 5200, 5205, 5210, 5215, 5220, 5225, 5230, 5235, 5240, 5245, 5250, 5255, 5260, 5265, 5270, 5275, 5280, 5285, 5290, 5295, 5300, 5305, 5310, 5315, 5320, 5325, 5330, 5335, 5340, 5345, 5350, 5355, 5360, 5365, 5370, 5375, 5380, 5385, 5390, 5395, 5400, 5405, 5410, 5415, 5420, 5425, 5430, 5435, 5440, 5445, 5450, 5455, 5460, 5465, 5470, 5475, 5480, 5485, 5490, 5495, 5500, 5505, 5510, 5515, 5520, 5525, 5530, 5535, 5540, 5545, 5550, 5555, 5560, 5565, 5570, 5575, 5580, 5585, 5590, 5595, 5600, 5605, 5610, 5615, 5620, 5625, 5630, 5635, 5640, 5645, 5650, 5655, 5660, 5665, 5670, 5675, 5680, 5685, 5690, 5695, 5700, 5705, 5710, 5715, 5720, 5725, 5730, 5735, 5740, 5745, 5750, 5755, 5760, 5765, 5770, 5775, 5780, 5785, 5790, 5795, 5800, 5805, 5810, 5815, 5820, 5825, 5830, 5835, 5840, 5845, 5850, 5855, 5860, 5865, 5870, 5875, 5880, 5885, 5890, 5895, 5900, 5905, 5910, 5915, 5920, 5925, 5930, 5935, 5940, 5945, 5950, 5955, 5960, 5965, 5970, 5975, 5980, 5985, 5990, 5995, 6000, 6005, 6010, 6015, 6020, 6025, 6030, 6035, 6040, 6045, 6050, 6055, 6060, 6065, 6070, 6075, 6080, 6085, 6090, 6095, 6100, 6105, 6110, 6115, 6120, 6125, 6130, 6135, 6140, 6145, 6150, 6155, 6160, 6165, 6170, 6175, 6180, 6185, 6190, 6195, 6200, 6205, 6210, 6215, 6220, 6225, 6230, 6235, 6240, 6245, 6250, 6255, 6260, 6265, 6270, 6275, 6280, 6285, 6290, 6295, 6300, 6305, 6310, 6315, 6320, 6325, 6330, 6335, 6340, 6345, 6350, 6355, 6360, 6365, 6370, 6375, 6380, 6385, 6390, 6395, 6400, 6405, 6410, 6415, 6420, 6425, 6430, 6435, 6440, 6445, 6450, 6455, 6460, 6465, 6470, 6475, 6480, 6485, 6490, 6495, 6500, 6505, 6510, 6515, 6520, 6525, 6530, 6535, 6540, 6545, 6550, 6555, 6560, 6565, 6570, 6575, 6580, 6585, 6590, 6595, 6600, 6605, 6610, 6615, 6620, 6625, 6630, 6635, 6640, 6645, 6650, 6655, 6660, 6665, 6670, 6675, 6680, 6685, 6690, 6695, 6700, 6705, 6710, 6715, 6720, 6725, 6730, 6735, 6740, 6745, 6750, 6755, 6760, 6765, 6770, 6775, 6780, 6785, 6790, 6795, 6800, 6805, 6810, 6815, 6820, 6825, 6830, 6835, 6840, 6845, 6850, 6855, 6860, 6865, 6870, 6875, 6880, 6885, 6890, 6895, 6900, 6905, 6910, 6915, 6920, 6925, 6930, 6935, 6940, 6945, 6950, 6955, 6960, 6965, 6970, 6975, 6980, 6985, 6990, 6995, 7000, 7005, 7010, 7015, 7020, 7025, 7030, 7035, 7040, 7045, 7050, 7055, 7060, 7065, 7070, 7075, 7080, 7085, 7090, 7095, 7100, 7105, 7110, 7115, 7120, 7125, 7130, 7135, 7140, 7145, 7150, 7155, 7160, 7165, 7170, 7175, 7180, 7185, 7190, 7195, 7200, 7205, 7210, 7215, 7220, 7225, 7230, 7235, 7240, 7245, 7250, 7255, 7260, 7265, 7270, 7275, 7280, 7285, 7290, 7295, 7300, 7305, 7310, 7315, 7320, 7325, 7330, 7335, 7340, 7345, 7350, 7355, 7360, 7365, 7370, 7375, 7380, 7385, 7390, 7395, 7400, 7405, 7410, 7415, 7420, 7425, 7430, 7435, 7440, 7445, 7450, 7455, 7460, 7465, 7470, 7475, 7480, 7485, 7490, 7495, 7500, 7505, 7510, 7515, 7520, 7525, 7530, 7535, 7540, 7545, 7550, 7555, 7560, 7565, 7570, 7575, 7580, 7585, 7590, 7595, 7600, 7605, 7610, 7615, 7620, 7625, 7630, 7635, 7640, 7645, 7650, 7655, 7660, 7665, 7670, 7675, 7680, 7685, 7690, 7695, 7700, 7705, 7710, 7715, 7720, 7725, 7730, 7735, 7740, 7745, 7750, 7755, 7760, 7765, 7770, 7775, 7780, 7785, 7790, 7795, 7800, 7805, 7810, 7815, 7820, 7825, 7830, 7835, 7840, 7845, 7850, 7855, 7860, 7865, 7870, 7875, 7880, 7885, 7890, 7895, 7900, 7905, 7910, 7915, 7920, 7925, 7930, 7935, 7940, 7945, 7950, 7955, 7960, 7965, 7970, 7975, 7980, 7985, 7990, 7995, 8000, 8005, 8010, 8015, 8020, 8025, 8030, 8035, 8040, 8045, 8050, 8055, 8060, 8065, 8070, 8075, 8080, 8085, 8090, 8095, 8100, 8105, 8110, 8115, 8120, 8125, 8130, 8135, 8140, 8145, 8150, 8155, 8160, 8165, 8170, 8175, 8180, 8185, 8190, 8195, 8200, 8205, 8210, 8215, 8220, 8225, 8230, 8235, 8240, 8245, 8250, 8255, 8260, 8265, 8270, 8275, 8280, 8285, 8290, 8295, 8300, 8305, 8310, 8315, 8320, 8325, 8330, 8335, 8340, 8345, 8350, 8355, 8360, 8365, 8370, 8375, 8380, 8385, 8390, 8395, 8400, 8405, 8410, 8415, 8420, 8425, 8430, 8435, 8440, 8445, 8450, 8455, 8460, 8465, 8470, 8475, 8480, 8485, 8490, 8495, 8500, 8505, 8510, 8515, 8520, 8525, 8530, 8535, 8540, 8545, 8550, 8555, 8560, 8565, 8570, 8575, 8580, 8585, 8590, 8595, 8600, 8605, 8610, 8615, 8620, 8625, 8630, 8635, 8640, 8645, 8650, 8655, 8660, 8665, 8670, 8675, 8680, 8685, 8690, 8695, 8700, 8705, 8710, 8715, 8720, 8725, 8730, 8735, 8740, 8745, 8750, 8755, 8760, 8765, 8770, 8775, 8780, 8785, 8790, 8795, 8800, 8805, 8810, 8815, 8820, 8825, 8830, 8835, 8840, 8845, 8850, 8855, 8860, 8865, 8870, 8875, 8880, 8885, 8890, 8895, 8900, 8905, 8910, 8915, 8920, 8925, 8930, 8935, 8940, 8945, 8950, 8955, 8960, 8965, 8970, 8975, 8980, 8985, 8990, 8995, 9000, 9005, 9010, 9015, 9020, 9025, 9030, 9035, 9040, 9045, 9050, 9055, 9060, 9065, 9070, 9075, 9080, 9085, 9090, 9095, 9100, 9105, 9110, 9115, 9120, 9125, 9130, 9135, 9140, 9145, 9150, 9155, 9160, 9165, 9170, 9175, 9180, 9185, 9190, 9195, 9200, 9205, 9210, 9215, 9220, 9225, 9230, 9235, 9240, 9245, 9250, 9255, 9260, 9265, 9270, 9275, 9280, 9285, 9290, 9295, 9300, 9305, 9310, 9315, 9320, 9325, 9330, 9335, 9340, 9345, 9350, 9355, 9360, 9365, 9370, 9375, 9380, 9385, 9390, 9395, 9400, 9405, 9410, 9415, 9420, 9425, 9430, 9435, 9440, 9445, 9450, 9455, 9460, 9465, 9470, 9475, 9480, 9485, 9490, 9495, 9500, 9505, 9510, 9515, 9520, 9525, 9530, 9535, 9540, 9545, 9550, 9555, 9560, 9565, 9570, 9575, 9580, 9585, 9590, 9595, 9600, 9605, 9610, 9615, 9620, 9625, 9630, 9635, 9640, 9645, 9650, 9655, 9660, 9665, 9670, 9675, 9680, 9685, 9690, 9695, 9700, 9705, 9710, 9715, 9720, 9725, 9730, 9735, 9740, 9745, 9750, 9755, 9760, 9765, 9770, 9775, 9780, 9785, 9790, 9795, 9800, 9805, 9810, 9815, 9820, 9825, 9830, 9835, 9840, 9845, 9850, 9855, 9860, 9865, 9870, 9875, 9880, 9885, 9890, 9895, 9900, 9905, 9910, 9915, 9920, 9925, 9930, 9935, 9940, 9945, 9950, 9955, 9960, 9965, 9970, 9975, 9980, 9985, 9990, 9995, 10000, 10005, 10010, 10015, 10020, 10025, 10030, 10035, 10040, 10045, 10050, 10055, 10060, 10065, 10070, 10075, 10080, 10085, 10090, 10095, 10100, 10105, 10110, 10115, 10120, 10125, 10130, 10135, 10140, 10145, 10150, 10155, 10160, 10165, 10170, 10175, 10180, 10185, 10190, 10195, 1020



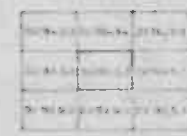
Contours: 110 120 130 140 150 160 170 180 190 200
 Transmitter: FUG 15.3 kHz
 Instruments: GEONICS EM-16
 Filter: filtered



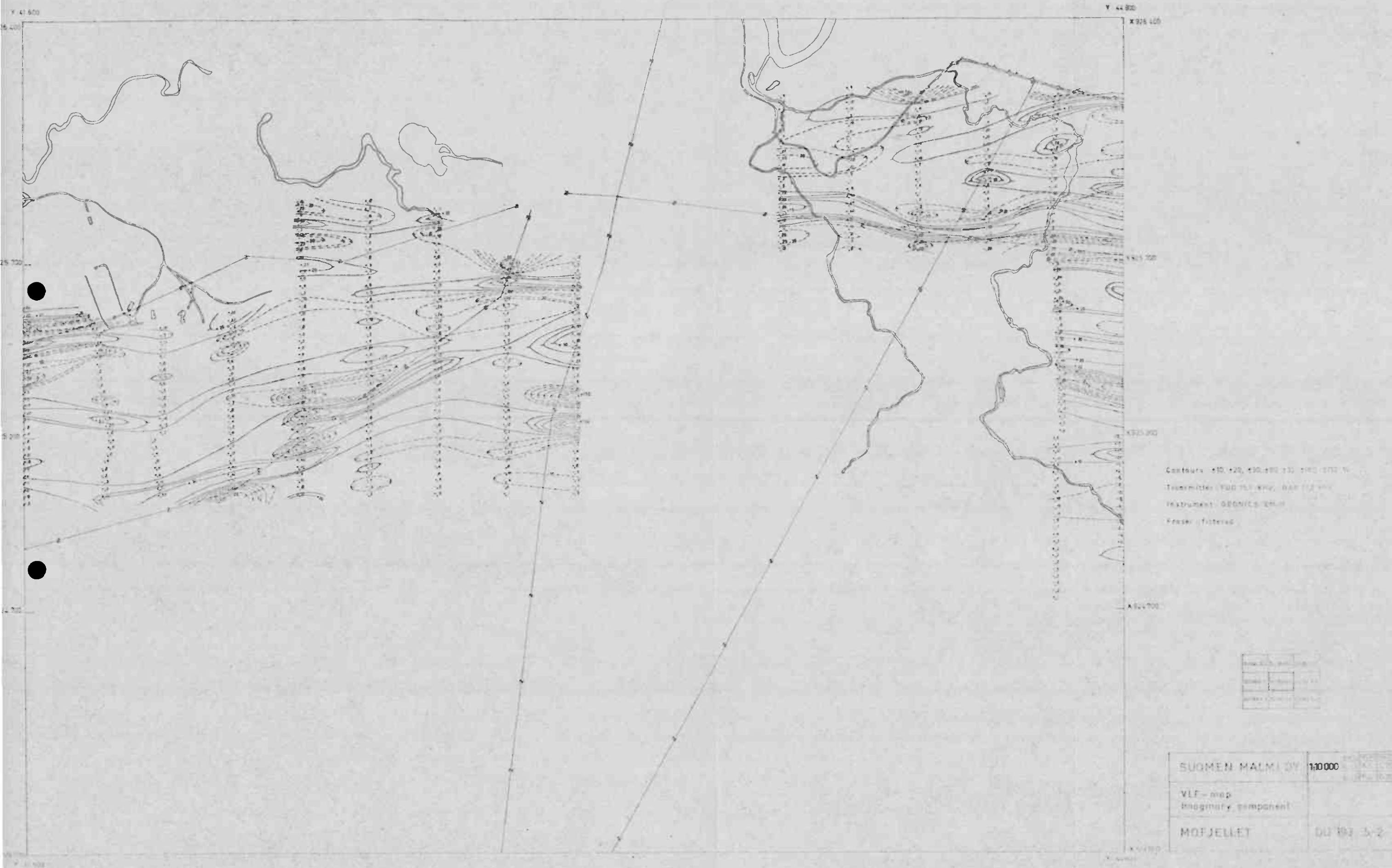
SUOMEN MALMI OY	1:10 000
VLF-mop imaginary component	
MOFJELLET	DU 193-5-1

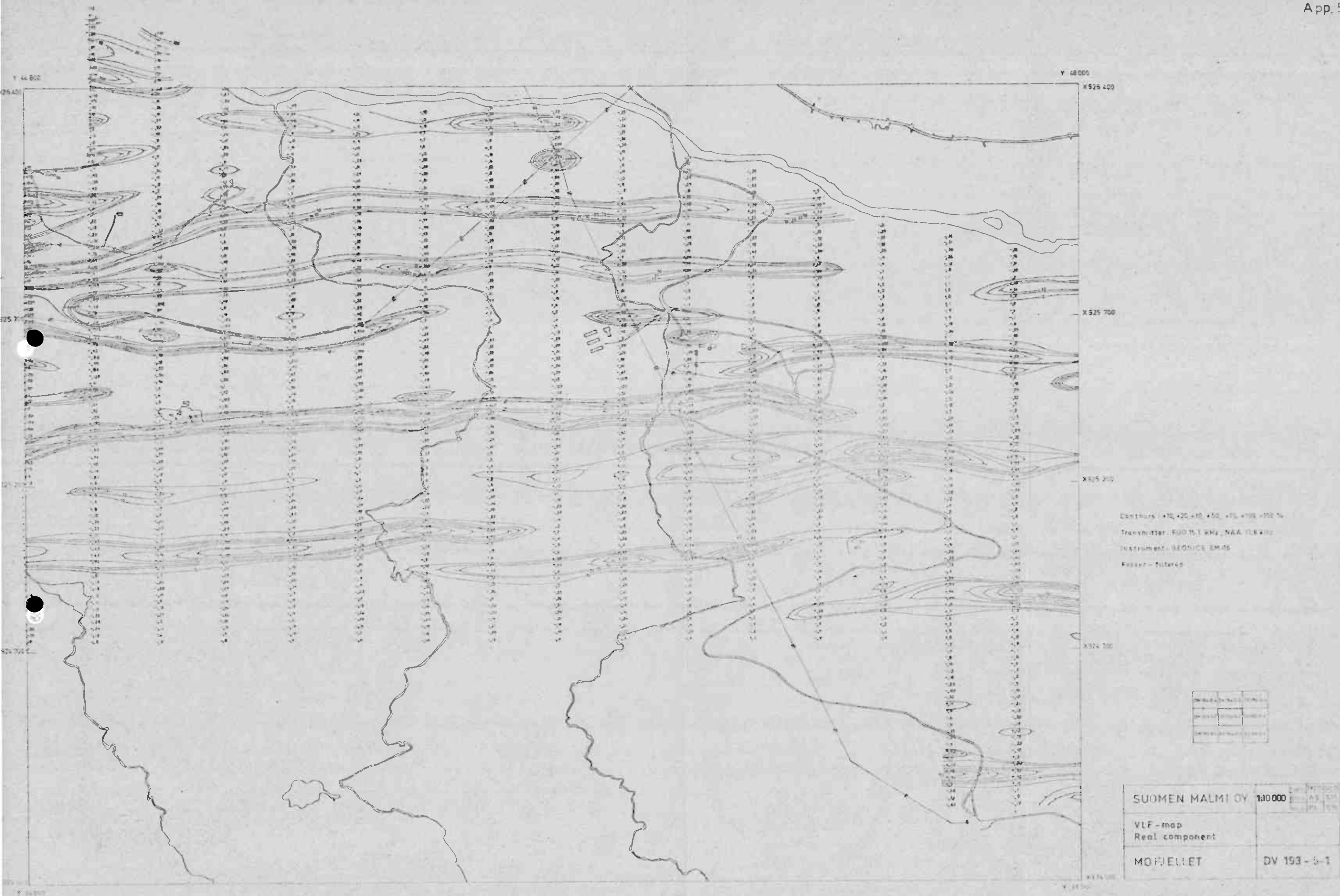


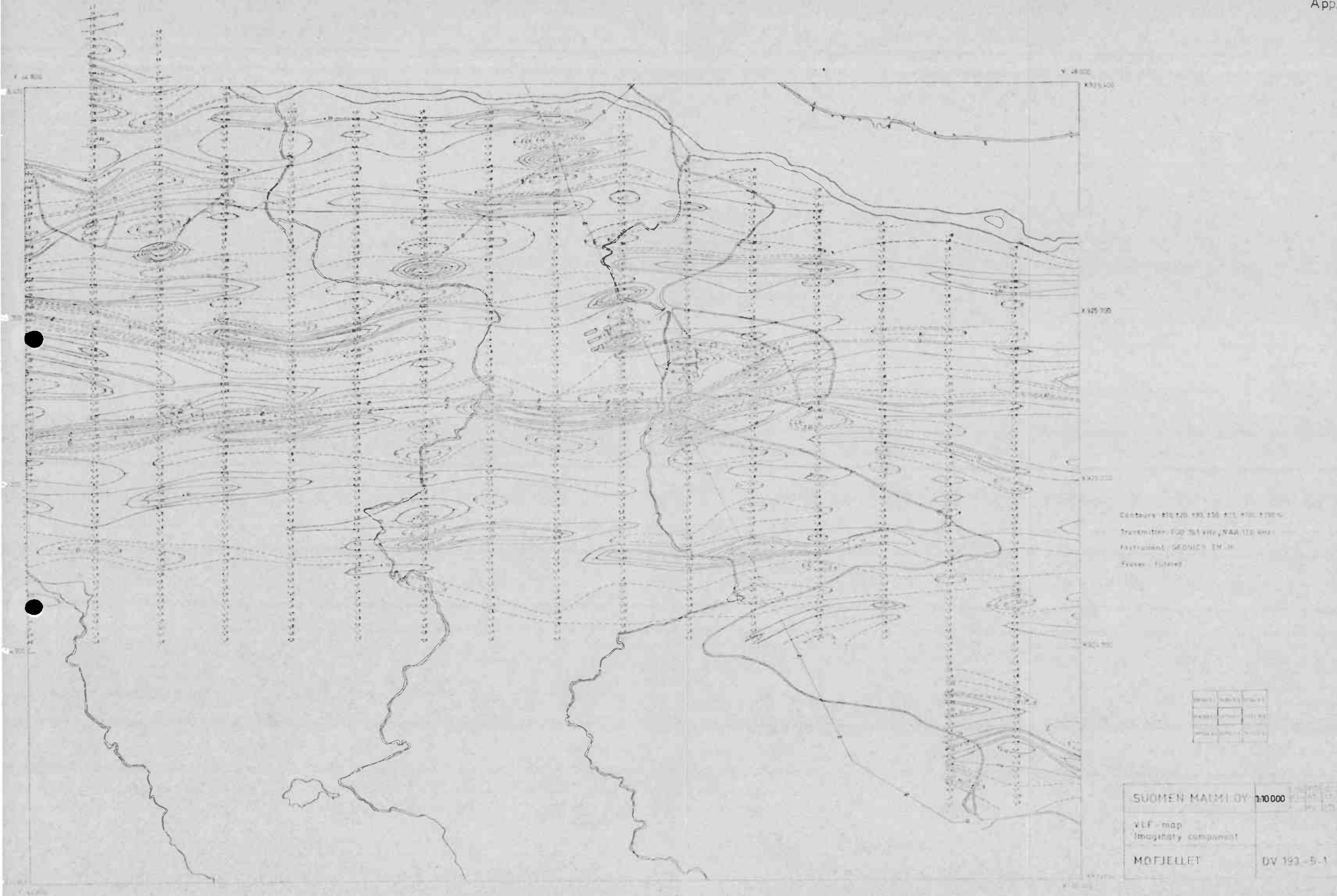
Contours - 40, +20, +30, +50, +75, +100, +120 W
 Transmitter: FGD 15.1 kHz, NAB 17.8 kHz
 Instrument: GEONICS EM-18
 Filter: - filtered

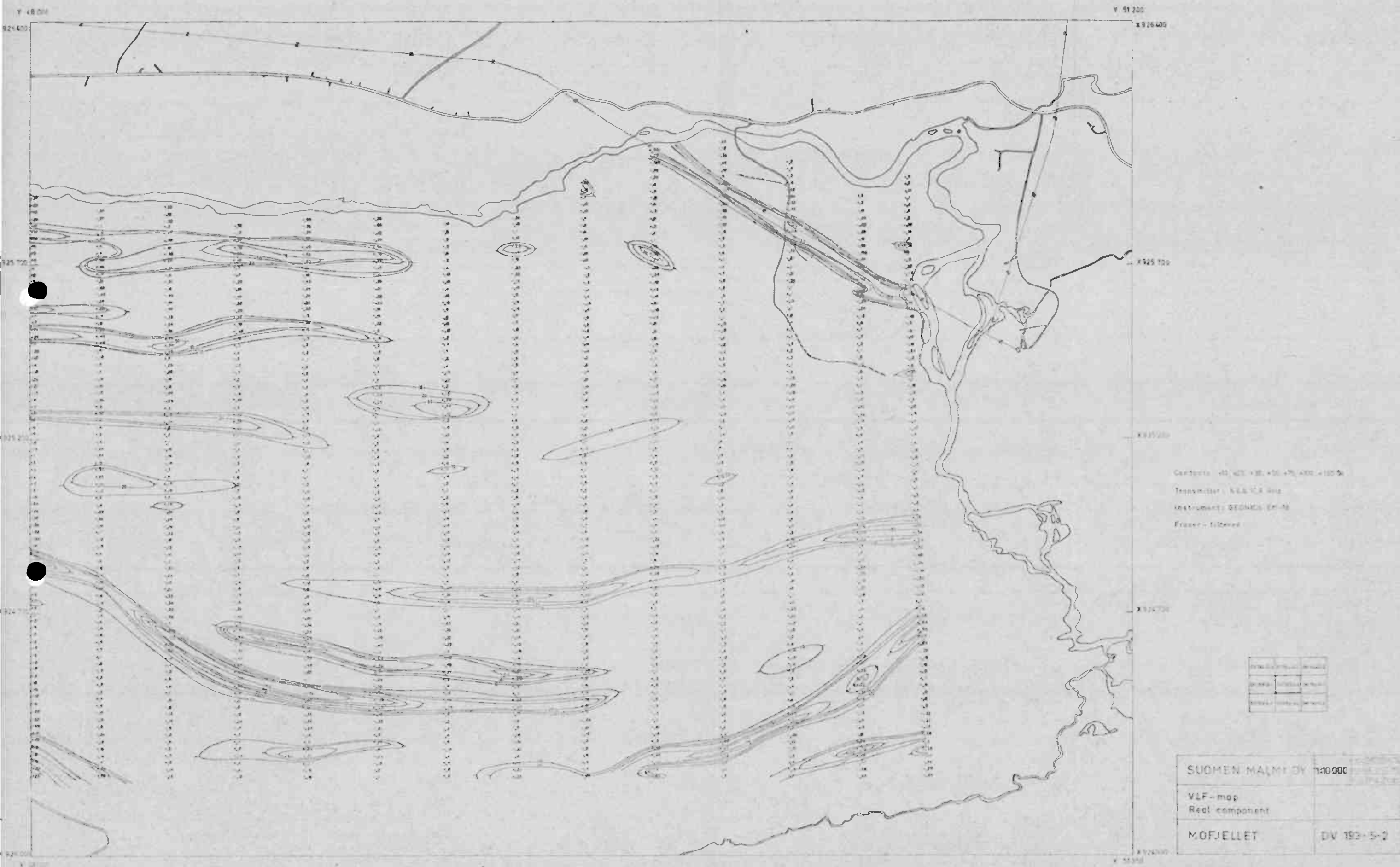


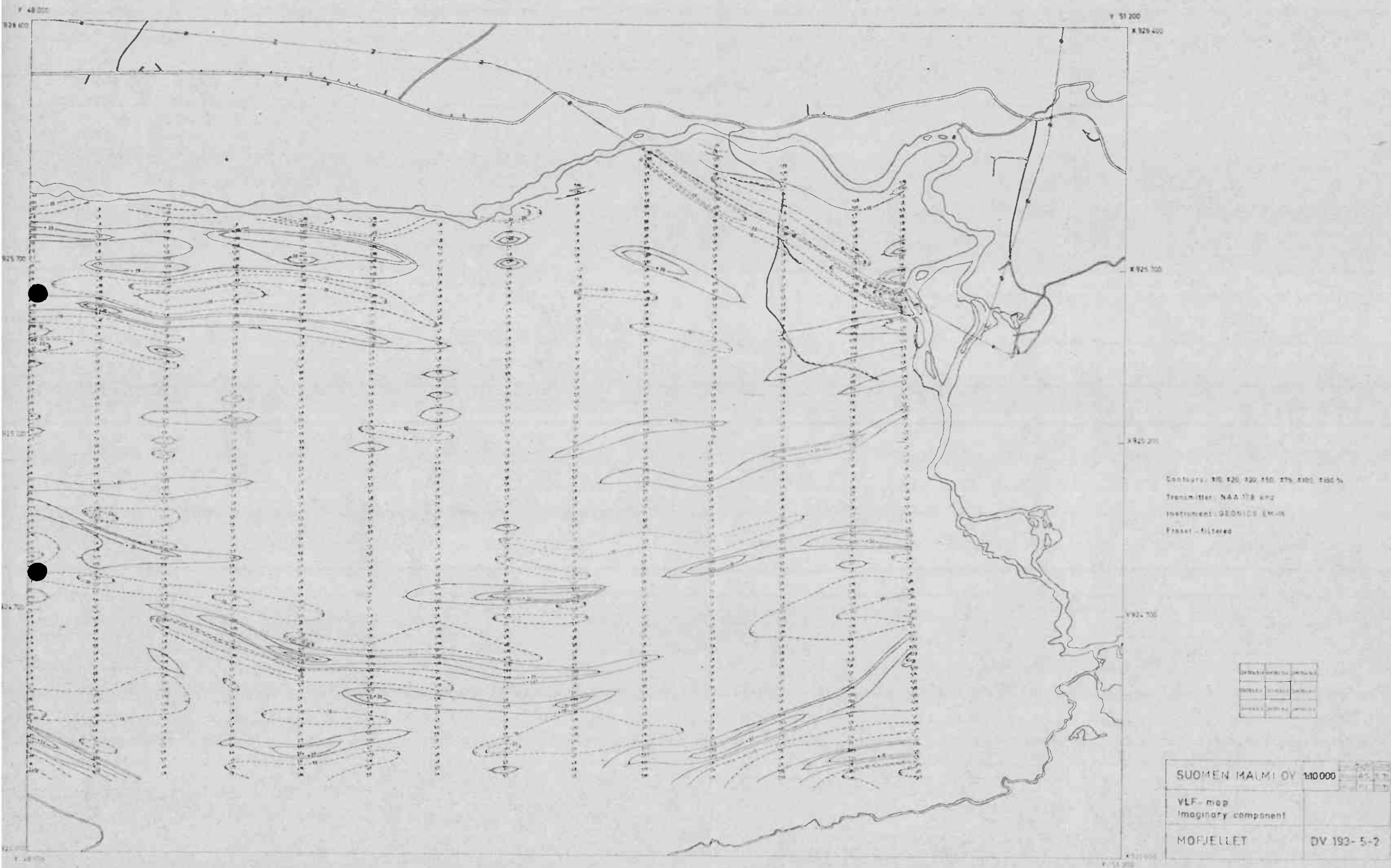
SUOMEN MALMI OY	1:1000	1953-5-2
VLF-map		
Real component		
MOFJELLET	DU 193-5-2	

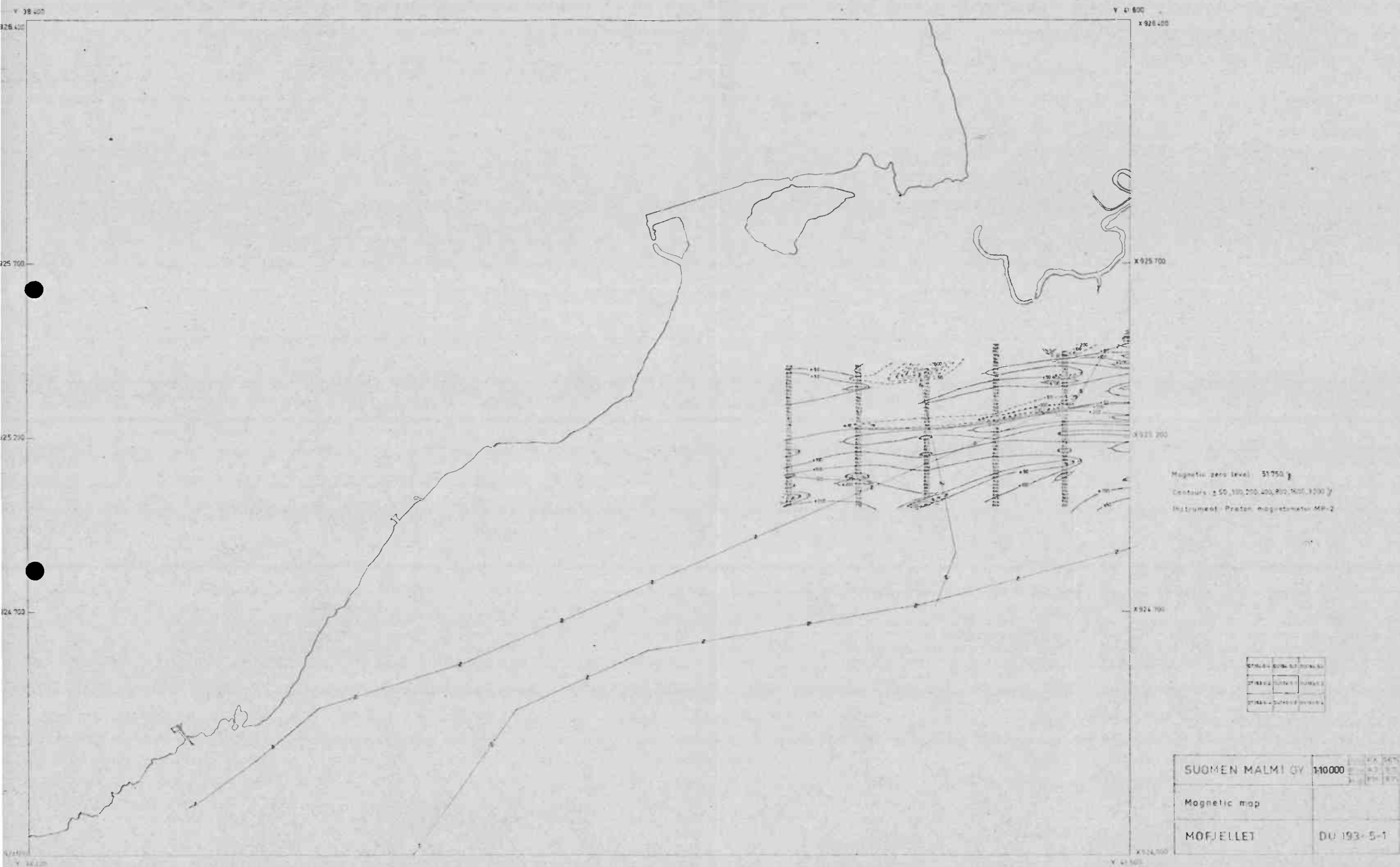


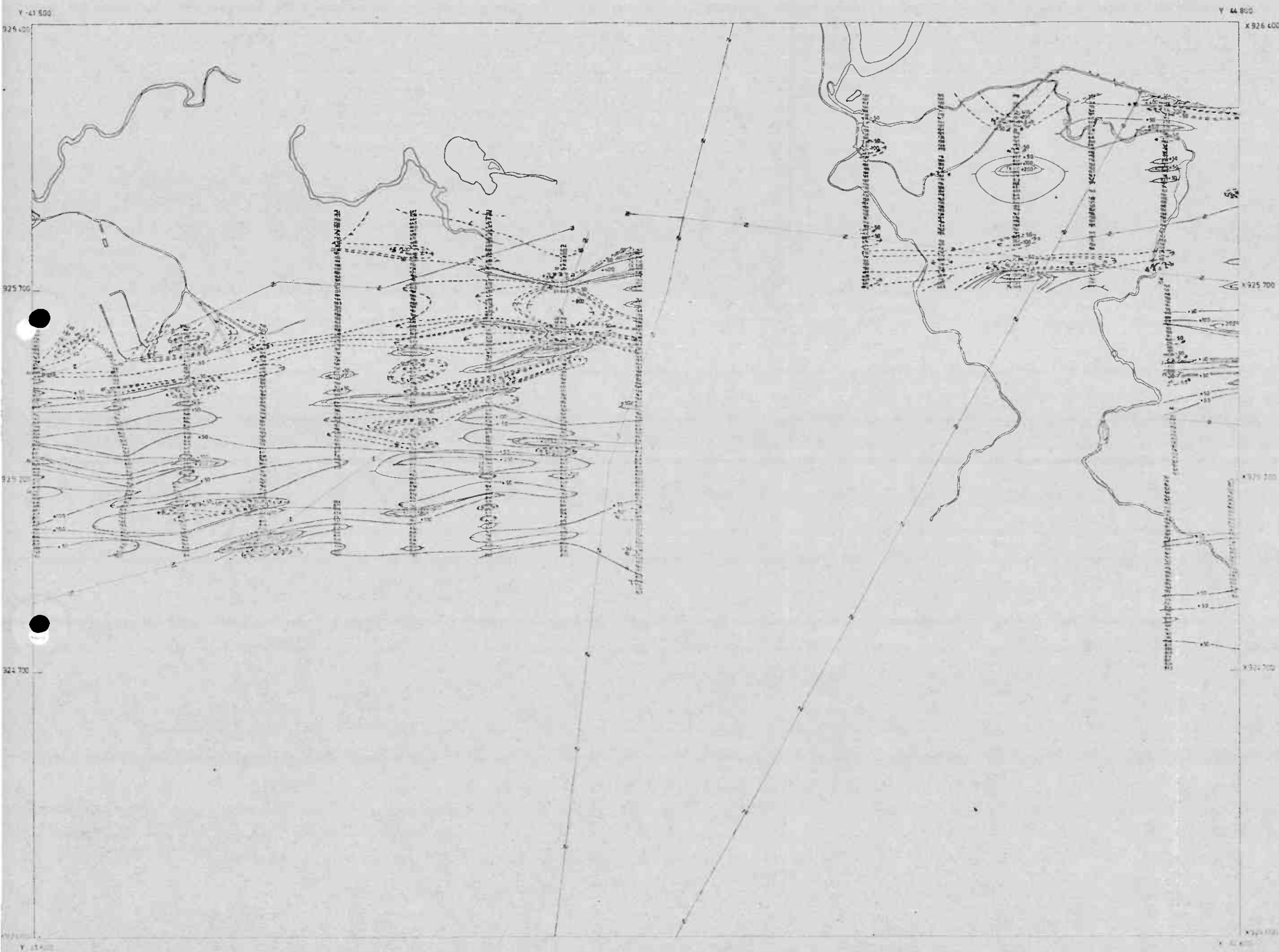












Magnetic zero level: 51750 γ
 Contours: ± 10, 100, 200, 400, 800, 1600, 3200 γ
 Instrument: Proton magnetometer MP-2

0-1000	1000-2000	2000-3000
3000-4000	4000-5000	5000-6000
6000-7000	7000-8000	8000-9000
9000-10000	10000-11000	11000-12000

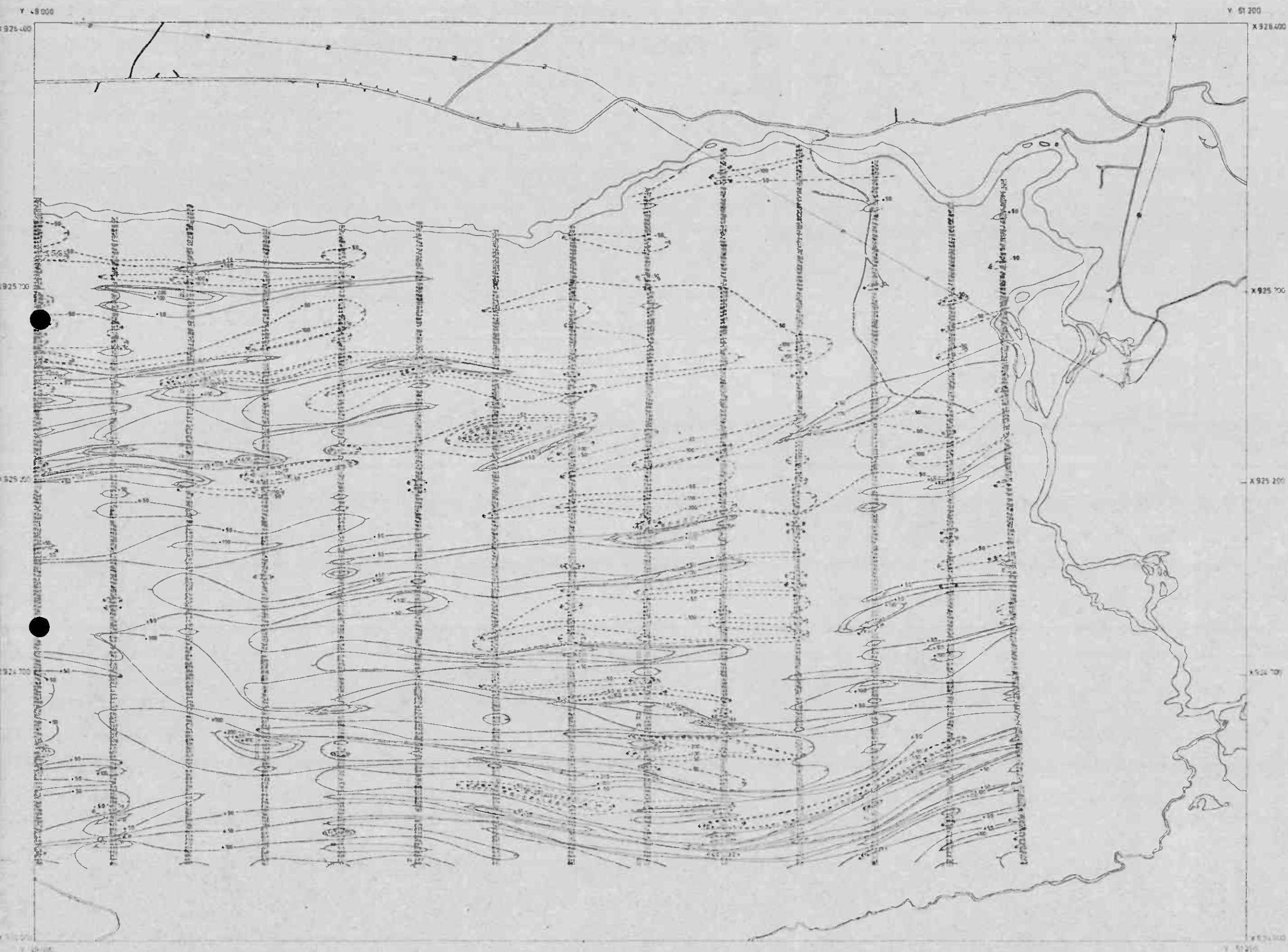
SUOMEN MALMI OY	1:10 000	1:10 000
Magnetic map		
MOFJELLET	DU 193-5-2	



Magnetic zero level 51.750 g
 Contours 150, 100, 200, 400, 600, 1000, 1200 g
 Instrument: Proton magnetometer MP-2

01 14 5	01 14 5	01 14 5
01 14 5	01 14 5	01 14 5
01 14 5	01 14 5	01 14 5

SUOMEN MALMI OY	1:10 000	AS 8 75
Magnetic map		PM 8 75
MOFJELLET	DV 193-5-1	



Magnetic zero level: 51 700 γ
 Contours: 50, 100, 200, 400, 800, 1600, 3200 γ
 Instrument: Proton magnetometer MP-2

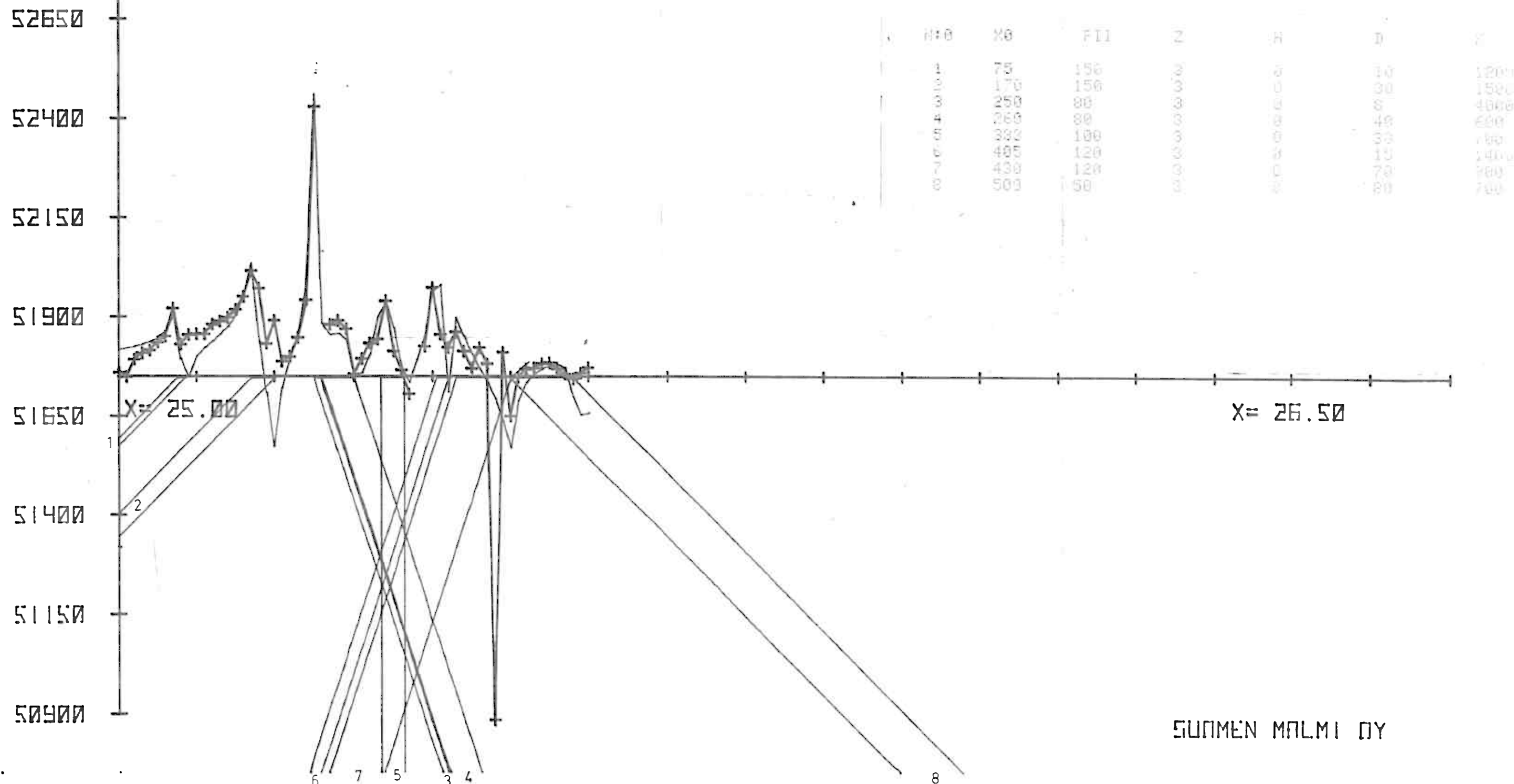
0-100	0-100	0-100
0-100	0-100	0-100
0-100	0-100	0-100

SUOMEN KALMI OY	1:10000	193-5-2
Magnetic map		
MOFJELLET		DV 193-5-2

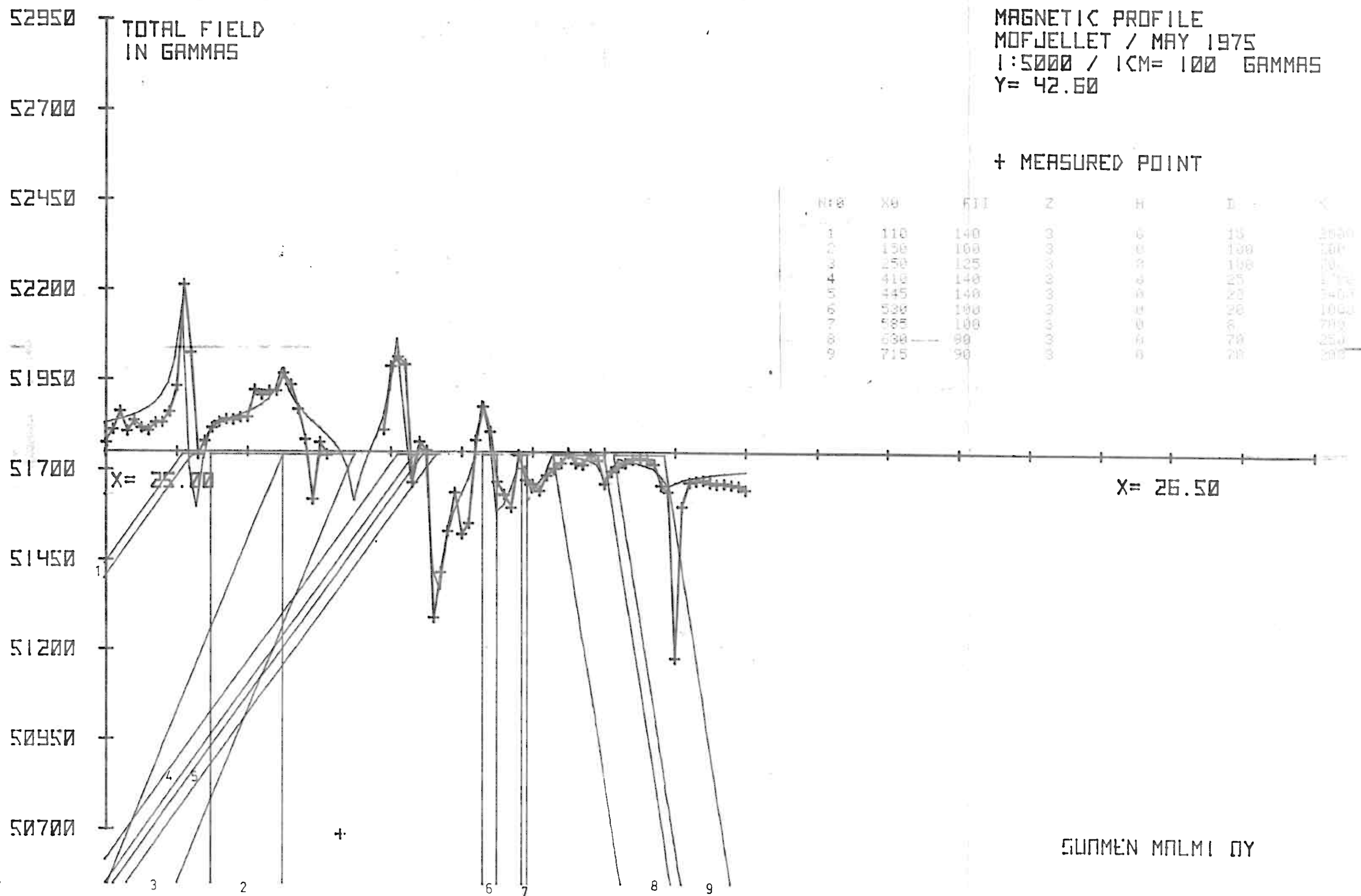
TOTAL FIELD
IN GAMMAS

MAGNETIC PROFILE
MOFJELLET / MAY 1975
1:5000 / 1CM= 100 GAMMAS
Y= 41.60

+ MEASURED POINT

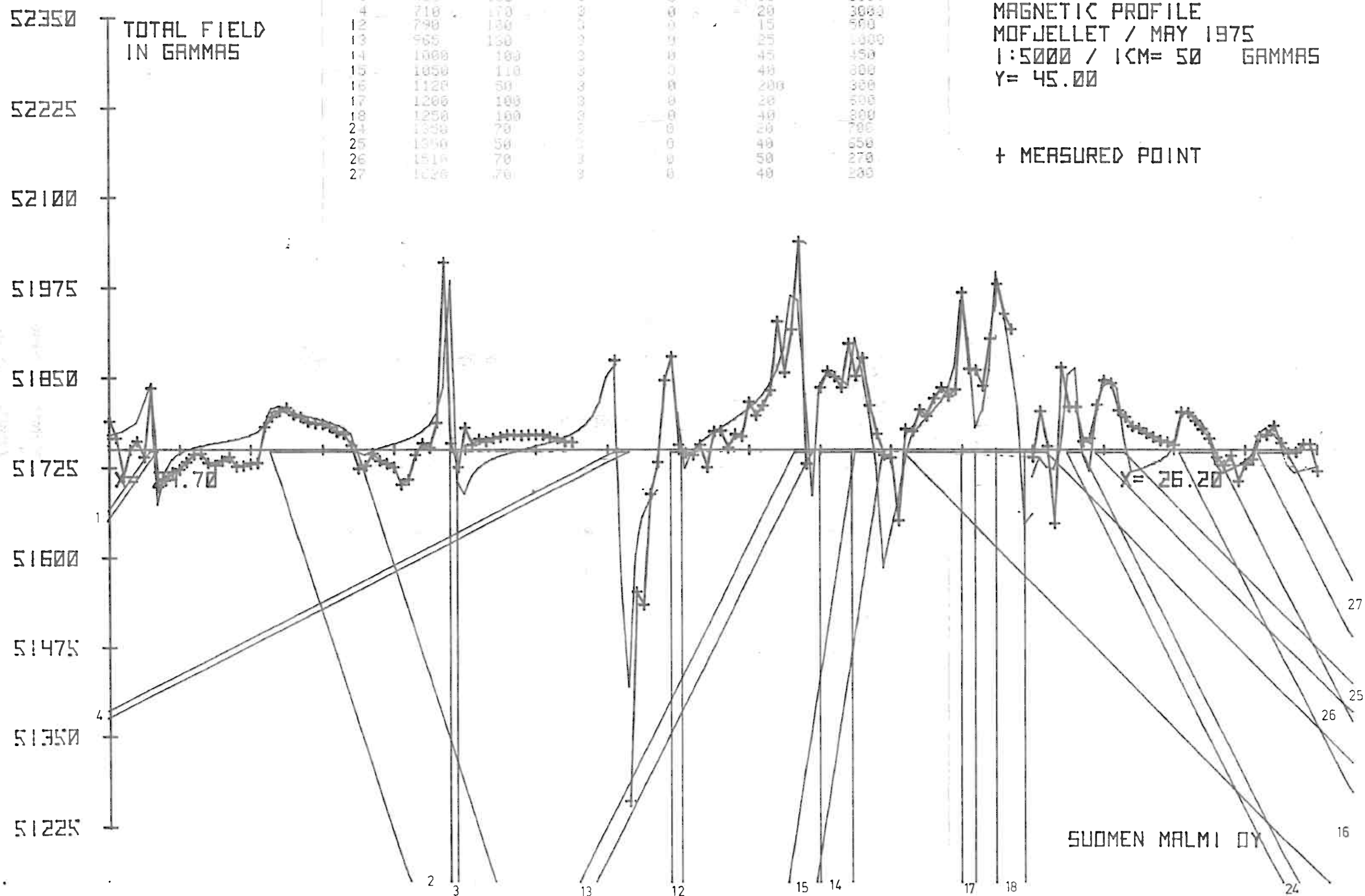


SUMMEN MALMI DY



MAGNETIC PROFILE
MOFJELLET / MAY 1975
1:5000 / 1CM= 50 GAMMAS
Y= 45.00

+ MEASURED POINT



N:0	80	FI	2	1	D	K
1	50	140	3	0	10	300
2	230	80	3	0	120	150
3	480	100	3	0	10	1300
4	710	170	3	0	20	3000
12	790	130	3	0	15	500
13	965	130	3	0	25	1000
14	1000	100	3	0	45	450
15	1050	110	3	0	40	600
16	1120	50	3	0	200	300
17	1200	100	3	0	20	500
18	1250	100	3	0	40	800
24	1350	70	3	0	20	700
25	1350	50	3	0	40	650
26	1510	70	3	0	50	270
27	1620	70	3	0	40	200

52250
TOTAL FIELD
IN GAMMAS

52125

52000

51875

51750

51625

51500

51375

51250

51125

TOTAL FIELD
IN GAMMAS

X= 24.20

X= 26.20

N	XG	FIT	Z	H	D	K
1	110	130	3	0	20	1500
2	145	130	3	0	20	1300
3	266	120	3	0	30	300
4	325	120	3	0	15	700
5	370	160	3	0	40	400
6	430	160	3	0	20	500
7	650	160	3	0	20	1000
8	690	130	3	0	20	500
9	710	130	3	0	40	1400
10	780	130	3	0	40	300
11	820	130	3	0	20	700
12	880	130	3	0	10	1000
13	915	130	3	0	15	300
14	990	130	3	0	10	400
15	1040	130	3	0	30	1000
16	1130	120	3	0	20	300

MAGNETIC PROFILE
MOFJELLET / MAY 1975
1:5000 / 1CM= 50 GAMMAS
Y= 47.40

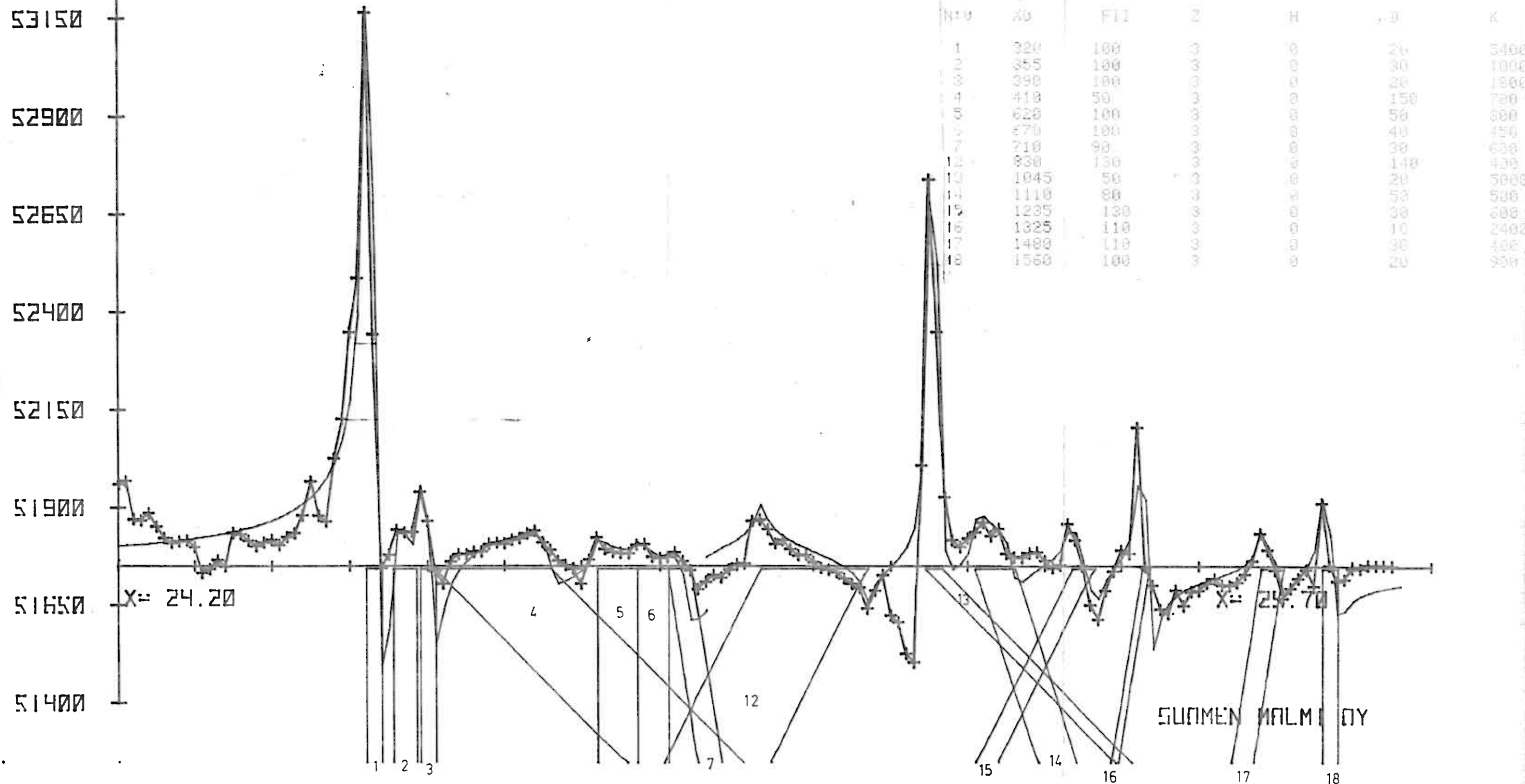
+ MEASURED POINT

SUMMEN MØLMT PY

53650
TOTAL FIELD
IN GAMMAS

MAGNETIC PROFILE
MOFJELLET / MAY 1975
1:5000 / 1CM = 100 GAMMAS
Y = 48.60

+ MEASURED POINT



52700
TOTAL FIELD
IN GAMMAS

MAGNETIC PROFILE
MOFJELLET / MAY 1975
1:5000 / 1CM= 50 GAMMAS
Y= 50.40

+ MEASURED POINT

N:0	X0	FH	Z	H	D	K
1	155	130	0	0	25	400
2	230	120	0	0	10	500
3	250	110	0	0	20	1500
4	280	110	0	0	35	1200
5	355	100	0	0	30	400
6	455	100	0	0	25	300
7	493	100	0	0	40	400
8	540	100	0	0	35	700
9	580	100	0	0	20	1200
12	690	140	0	0	0	550
13	720	130	0	0	0	300
14	740	130	0	0	20	750
15	900	130	0	0	20	300
16	1000	130	0	0	20	1100
17	1200	130	0	0	30	400

52200

52075

51950

51825

51700

51575

X= 24.20

X= 25.70

SUMMEN MALMI OY

1

2

3

4

5

6

7

12

8

13

14

12

13

9

15

16

17