

ARCO Norway, Inc.
Hard Minerals Section

Report No. 83-670-5

GROUND MAGNETIC ORIENTATION SURVEY ^{AND} HEAVY FRACTION STREAM SAMPLING
THE ROMBAKEN PROJECT 1983, NORTH NORWAY

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SUMMARY

Sixteen profiles with a total length of about 20 km have been surveyed by magnetometer (total field) over the Rombaken project area of around 1000 km². The profiles traverse a variety of rock types, rock contacts and mineralizations. It is concluded that the magnetometer can be a useful mapping tool in the Rombaken area, however, with regard to outlining potential economic mineralization the method is more dubious. The magnetometer is recommended to be included in any future geophysical surveys in Rombaken and an extended program with orientation profiles should be conducted next season.

Fifty six heavy fraction stream samples were collected within the same project area. The sampling was a first follow up of Au-anomalies outlined during a geochemical stream sediment program done earlier in the season. Four samples contained free gold, 3 from the same locality. The results were confirmed by later assays. It is concluded that the method is successful regarding target selection. A more systematic sampling program is recommended for the '84 season. Sample preparation and examination should be carried out in the field to enable immediate follow up work.

Table of Contents

1.	<u>INTRODUCTION</u>	p. 1
1.1	Locality	p. 1
1.2	General information	p. 1
1.3	Objective	p. 1
2.	<u>GROUND MAGNETIC SURVEY</u>	p. 1
2.1	Introduction	p. 1
2.2	Previous work	p. 2
2.3	Current survey	p. 3
3.	<u>HEAVY FRACTION STREAM SAMPLING</u>	p. 4
3.1	Field program and sample preparation	p. 4
3.2	Results	p. 5
4.	<u>CONCLUSION AND RECOMMENDATION</u>	p. 6
4.1	Ground magnetics	p. 6
4.2	Heavy fraction sampling	p. 6

APPENDIX I: Magnetic Profiles

APPENDIX II: Assay Results and Comments From
Tucson and Denver

List of Figures

Location map 1:8 000 000	Fig. 1
Profile and sample locality map Narvik 1:50 000	Fig. 2
Profile and sample locality map Skjomedalen 1:50 000	Fig. 3

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GROUND MAGNETIC ORIENTATION SURVEY
HEAVY FRACTION STREAM SAMPLING
THE ROMBAKEN PROJECT 1983, NORTH NORWAY

1. INTRODUCTION1.1 Locality

The Rombaken project area is located within the Rombaken Precambrian window in Nordland fylke (county). It is centered at 68°15'N, 17°45'E approximately 30 km southeast of Narvik. Its eastern and southern boundaries are determined by the border with Sweden, see fig. 1.

1.2 General Information

General information with regard to physiography, access, etc., can be found in the report on the geology of the project area, see report no. 83-670-6.

The major field program in Rombaken during 1983 consisted of geological mapping with concurrent rock chip sampling and a stream sediment sampling program. The work described here was done as follow up of preliminary results from this major program; i.e. definition of geological units and mineralization before starting the mag. survey, and receipt of stream sediment assay results prior doing the heavy fraction sampling.

1.3 Objective

The objective of the magnetic survey was to test the magnetic properties and susceptibility of known rock units, rocks and contact zones in order to determine whether the method would be useful as a mapping tool or indicate mineralization.

As assay results were periodically returned from the stream sampling survey, several discreet areas anomalous in gold were defined. Heavy fraction sampling of the same streams was intended to confirm anomalies, give us further information about the gold's existence, and assist in selecting the best targets for follow up.

2. GROUND MAGNETIC SURVEY2.1 Introduction

The survey, including travelling time, was carried out during the period 5th to 15th August.

Sixteen profiles with a total length of 19.8 km were measured by 2 men during 6 field-days.

Location of the profiles are shown on the overlays for the 1:50 000 map sheets 1431 IV, Narvik and 1431 III, Skjomedalen, see fig. 2 and 3.

Two EDA proton-magnetometers, type ppm-375 and ppm-350, were used. During the magnetic survey, susceptibility was measured with a Scintrex SM-5.

The following list indicates the location of the profiles, their length and bearing:

Profile No's	Location	Map	Length	Bearing
1,10,11, 12,13,15	Norddalen))	1431 III	5.0 km	along road and 110°
8,9	Losihytten,) Norddalen)		4.9 km	90°
2,3	N of Gaute-) lisvatnet)		1.1 km	110°
4,5,6	Sørdalen)		4.7 km	along road and 110°
7	Haugfjellet))	1431 IV	3.3 km	mainly E-W
16,17	Sildvikskardet)		0.8 km	approx. 30°

2.2 Previous Work

No 1:50 000 aeromagnetic maps are available from Rombaken due to the rough terrain. The 1:250 000 aeromagnetic map of Narvik with 1500 m flight altitude and 2 km line spacing was of little help during this program.

During 1977 NGU flew from 2 to 4 parallel magnetic and radio metric helicopter traverses along Norddalen to Cunojavrrre, and from there towards the north-east past Sealggajavri. Our profiles, no's 1, 8, 10-13 and 15, are within this area, and no. 9 slightly to the north.

In 1981 the southwestern-most part of Sørdalen was covered by another helicopter survey equipped with EM- VLF, magnetometer and spectrometer. Our profiles 4, 5 and 6 are within this area.

The main objective for the latter helicopter work was a radiometric survey, because the granites in the Skjomen area had a reported high uranium background. This was confirmed by the helicopter survey; higher readings were recorded on Rombak than in other Precambrian terrain. The magnetic results will be commented upon below. (NGU Reports no's 1416/16 and 1836).

Ground VLF and SP was carried out by NGU over Ytre Sildvikskar Pb-Zn workings in 1976. As no ground magnetics were done our profiles 16 and 17 are within the same area. NGU found weak conductors possibly related to the mineralizations, but the survey was too limited in extent for any conclusive information. Comments regarding the magnetic profiles are given below. (NGU Report No. 1430/4B).

2.3 Current Survey

The geological position of the profiles is shown on the geological maps and rock description in report no. 83-670-6. The magnetic profiles are attached as Appendix I.

Norrdalen: Profiles 1, 10-13 and 15 A magnetite-quartzite BIF located during the mapping was the main reason for running these profiles. No. 1, which runs approximately along the road E-W, was started within a mixed package of metasediments with granitic and gabbroic intrusives 2,5 km to the west of the BIF. The gabbro give an anomaly of about 1000 gamma; otherwise the package has a generally weak magnetic expression with the BIF, as a clear exception, giving an anomaly of more than 2000 gamma at the western end of the profile. The purpose of the other profiles was a follow up of the BIF-horizon.

Losihytten: Profiles 8 and 9 Of main interest in this area were the rusty pyritic and/or pyrrhotitic zones within meta-greywackes and schist in the western part of the profiles. No magnetic contrast was seen over these zones.

The western end of profile 9 and the eastern end of both profiles traversed possible acid volcanics or fine grained granitoids. Along no. 9, a granite occurs between the meta-greywacke and the volcanics. The assumed volcanics show a distinct magnetic contrast to the sediments with a strong variation in magnetic susceptibility. The readings may reach 1500 gamma above the background for the sedimentary rocks. The granite in profile 8 causes only a slight increase in the magnetic field.

The magnetic expression detected along the profiles in Norrdalen and at Losivann corresponds well with the results of helicopter traverses done in 1977.

Gautelisvatnet: Profiles 2 and 3 Here the profiles cross an undifferentiated sediment-package including a marble horizon with Cu and Fe mineralization.

The mineralization appears on the magnetic profiles, as narrow and shallow bodies. A clear dipole anomaly is seen.

Sørdalen: Profiles 4-6 These lines are within the area covered by the NGU 1981 helicopter survey.

The area consists of a volcanic package of acid to intermediate composition and some thin sedimentary beds, all surrounded by granite.

The whole package shows a high level, high frequency magnetic field, which corresponds well with the results of the helicopter-borne survey.

It is difficult to detect a possible mineralized horizon within this package. This is indicated on profile 5 where it traverses a small Cu-magnetite mineralization without detecting it.

Haugfjellet: Profile 7 This profile is about 3,5 km long and traverses a thick sequence of mainly meta-greywackes. It starts at the granite contact in the west and was terminated within the granite to the east. It crosses two granitic "dykes" which divide the meta-greywackes into three separate horizons.

The westernmost horizon contains the mineralized unit at Haugfjellet. Pyrite and pyrrhotite dissemination is ubiquitous, higher sulphide concentrations occur in discrete zones up to 150 m wide, and a thin semi-massive to massive Cu, Pb, Zn mineralization 0,5 to 2 m wide occurs close to the first granite "dyke". This horizon has a distinctly different magnetic expression from the other two greywacke horizons to the east. The two latter are magnetically flat like the greywackes at Losivann.

The 150 m wide sulphide zone gives a magnetic anomaly of about 300 gamma and peaks at 1700 gamma above background; the thin massive mineralization, however, can not be detected on the profile.

Otherwise the eastern granite and some of the granite contacts exhibit a characteristic variation in the magnetic field.

Sildvikskardet: Profile 16 and 17 These two profiles are positioned across a Pb-Zn mineralization similar to the one at Haugfjellet. No magnetic expression over the mineralized zones can be seen on the profiles, with a possible exception along profile 17 where a 50 gamma increase appears when crossing the mineralization. This level, however, remains constant after the step and may indicate a diffuse rock contact.

3. HEAVY FRACTION STREAM SAMPLING

3.1 Field program and sample preparation

Altogether 56 samples numbered OS/83/501-556 were collected. One or two samples were taken from streams which had returned anomalous gold values (above 5 ppb Au) in the earlier stream sediment samples.

Heavy Fraction Sample Mineralogy

Estimated %

Sample Number OS/83-	Coordinate	Map Sheet	Weight (g)	Mag.	Ilmen. + Chrom.	Rutile	Zircon	Garnets	Apat.	Quartz	Feldsp	Amph. + Pyrox.	Tourm.	Sulf.	Number of grains gold	Fluorescence * : few grains ** : several grains
501	18050/98900	1431 IV	0,6380	30	30			20	8	10 mainly rose			2			*
502	18150/99150	"	0,1489	50	20			22	3	5						*
503	17650/99600	"	0,2995	50	15		2	20	3	5	3	2				
504	17500/99700	"	0,2649	35	14		1	45	1	2	1	1		1 grain FeS ₂		
505	17300/99950	"	5,0602	30	20		2	35	3	5	1	4				
506	17350/00300	"	0,4097	50	15		2	25	2	3	1	2		A few grains FeS ₂		
507	09150/88350	"	1,0671	50	10	5	2	5		20			Mica: 8			
508	09200/88350	"	0,7105	55	20	7		3		7		2	Mica: 3	Hemat. 3		*
509	09200/88650	"	0,0440	8	75	1		10	1	3			1	1 FeS ₂		*
510	09300/89000	"	0,0649	3	50			43	2	2						
511	09300/89150	"	2,0287	2	55			35		6		2				
512	09250/89150	"	1,0606	2	45	1		50		2						
513	08950/88750	1431 IV	0,0642	45	35	1		14		5				1 grain Cu FeS ₂		

Heavy Fraction Sample Mineralogy

E s t i m a t e d %

Sample Number OS/83-	Coordinate	Map Sheet	Weight (g)	Mag.	Ilmen. + Chrom.	Rutile	Zircon	Garnets	Apat.	Quartz	Feldsp	Amph. + Pyrox.	Tourm.	Sulf.	Number of grains gold	Fluorescence * : few grains ** : several grains
514	10800/88600	1431 IV	0,0680	55	25	1	1	12		5	1					
515	11450/88400	"	0,1289	50	16		2	30		2				A few grains FeS ₂		*
516	11750/88100	"	7,0681	40	15		5	25	3	2		10		A few grains FeS ₂		*
517	11850/87950	"	1,5223	5	10		2	45	3	5	15	15				*
518	11150/87600	"	0,1059	55	10		5	15		10	5					*
519	10550/87800	"	0,2192	5	5		5	30		25	25		Mica: 5			*
520	10250/88200	"	2,3960	5	15		5	40		15	10	10				*
521	09250/88300	"	0,1523	50	20		3	20		5	2					*
522	13500/88300	"	0,2436	40	25		6	20	A few grains	5	2	2				*
523	14750/68900	1431 III	0,6618	30	25			30	5	8	2					**
524	14850/68750	"	0,1694	40	20	1		30	1	8						
525	14900/68600	"	0,2462	30	17			17	2	16	11	2				
526	15050/68200	"	2,7381	45	20	1	2		2	15						**
										rose						
527	15250/67700	"	12,5908	2	30		6	35	2	25						**
										rose						

Heavy Fraction Sample Mineralogy

E s t i m a t e d %

Sample Number OS/83-	Coordinate	Map Sheet	Weight (g)	Mag.	Ilmen. + Chrom.	Rutile	Zircon	Garnets	Apat.	Quartz	Feldsp	Amph. + Pyrox.	Tourm.	Sulf.	Number of grains gold	Fluorescence * : few grains ** : several grains
528	15600/67300	1431 III	0,3953	25	20	1	2	25	5	20	1	1	A few grains			*
529	15300/67100	"	12,7192	2	40			34	6	15		3				*
530	23400/63550	"	27,9126	5	85	5		2	1	2				A few grains Cu FeS ₂		*
531	22650/63450	"	0,4553	40	15	5	5	10	3	10	12			A few grains FeS ₂		
532	22100/63650	"	0,3368	60	15	5	10	7	A few grains	3					2 irregular flaky grains one with quartz att.	*
533	21350/63950	"	4,1571	65	15	3	5	4	2	6 some rose						*
534	20650/63650	"	1,4118	62	10	3	6	5	3	10				1 FeS ₂		**
535	23300/66950	"	0,9080	45	25		5	14	4	6		1				*
536	08750/79100	1431 IV	0,1039	65	12	1	10	8		4						*
537	13850/84700	"	0,4076	15	10	3	15	20		30	5	2				*
538	13900/84850	"	0,5814	55	5	2	10	25	A few grains	3						*

Heavy Fraction Sample Mineralogy

Estimated %

Sample Number OS/83-	Coordinate	Map Sheet	Weight (g)	Mag.	Ilmen. + Chrom.	Rutile	Zircon	Garnets	Apat.	Quartz	Feldsp	Amph. + Pyrox.	Tourm.	Sulf.	Number of grains gold	Fluorescence
539	15150/83750	1431 IV	0,1008	45	10	1	5	35		4					8 grains, 6 irregular 1 needle shaped 1 flaky	* : few grains ** : several grains
540	14300/84050	"	0,5124	40	10	2	7	40		1						*
541	12900/84800	1431 IV	0,3625	50	15		4	30		1					1 irregular grain 0,2 mm	*
542	12050/84750	"	2,4154	3	30	1	2	45	2	14		3		A few grains FeS ₂	4 subrounded grains 0,1 mm	*
543	10700/84050	"	3,3079	5	40		5	30		15	5					*
544	11150/83700	"	2,1108	3	60	1	10	20	2	4						*
545	11950/82950	"	1,0686	5	60	1	2	30				2				*
546	11050/84300	"	2,5796	2	45		6	35	2	10						*
547	21100/86350	"	0,2697	55	20		5	15	4	1						*
548	21050/86300	"	0,4757	60	15		7	10	3	5						*
549	20450/86300	"	1,0859	50	20		3	15	2	10					mainly rose	*
550	19850/86450	"	0,3290	65	15		5	5		10						*

Heavy Fraction Sample Mineralogy

Estimated %

Sample Number OS/83-	Coordinate	Map Sheet	Weight (g)	Mag.	Ilmen. + Chrom.	Rutile	Zircon	Garnets	Apat.	Quartz	Feldsp	Amph. + Pyrox.	Tourn.	Sulf.	Number of grains gold	Fluorescence * : few grains ** : several grains
551	19300/86000	1431 IV	0,1427	50	25	1	3	5	1	15						*
552	18750/85450	"	0,6740	80	6		6		1	7						
553	14850/72900	1431 III	1,2613	35	25		10	25	1	4			A few grains			*
554	14300/70750	"	0,2440	70	10		15	4	1							*
555	13600/70300	"	0,6023	50	20	8		15	1	6			A few grains			
556	13200/70100	"	1,4697	35	25		6	20	2	10 mainly rose	1	1				*

Each anomalous area has from 1 to 15 sample sites, all shown in Fig. 2 and 3.

The samples consist of sieved material (-1 mm) bulked with panned material (8-10 pans from each sample site). The total weight of the samples vary between 1 and 2 kg.

The samples were transported to LKAB's laboratory in Grängesberg, Sweden where they were run by one of ARCO's temporary geologists on Goldhound 18" concentrating wheels. Two runs were made for each sample.

Each run consisted of 3 dl material which was kept in the machine for 10 minutes. The dip of the wheel (at 45°) and the flow of water were held constant during the whole program.

3.2 Results

Back in Oslo the heavy fraction material was weighed, subjected to an UV lamp and examined under a binocular microscope after magnetite had been separated by a hand magnet.

All the results are listed in Table 1.

Most of the heavy fraction material weighs around 1 g but varies from 0,044 g to 27,7192 g, mainly due to a strong variation in the magnetite, ilmenite and garnet content.

Fluorescent minerals were observed in several of the samples which was believed to be scheelite. This was, however, not confirmed by the assay results, see below.

Free gold was found in samples 532, 539, 541 and 542. From one to eight grains measuring between 0,1 and 0,2 mm were found in each sample. Three of the samples came from the same area near Klubbvann south of Rombaken and the fourth from the acid volcanics south of Cunojokka.

After visual examination, all the samples were sent to Tucson lab for assays on Au and Ag. As a control, assays were also done for Au, Ag, As, Cu, Pb, Zn, Cr, Co, Mo, Sn and W in the unconcentrated (sieved and panned) material.

All assay results are found in Appendix II.

Assays on concentrated material are not regarded reliable when done on <0.5 g. Comments by Tucson Lab. and Denver office is included in Appendix II. Still the observed gold was confirmed by the assays ranging from 0.118 ppm to 0.891 ppm Au. Another five samples returned gold values within the same range or higher. Sample no's 526, 533, 535, 538 and 551 assayed from 0.163 ppm to 4.02 ppm Au. Two of these samples came from Klubbvann, one from Cunojokka, one from north of Cunojokka and one from Losivann.

The two highest gold values from the assays on unconcentrated material refers to one sample from Klubbvann no. 540 and from Losivann no. 527. Otherwise, the assays on this material confirmed the Pb, Zn, As anomaly on Haugfjellet, the Pb, Zn, Au, As anomaly at Klubbvann and Cu, Zn, Co anomaly along the Caledonian nappe SSW of Rombaksbotn. See the stream sample results in report no. 83-670-7. No indication on W or Sn above the detection limits of 10 ppm and 30 ppm respectively were shown.

4. CONCLUSION AND RECOMMENDATION

4.1 Ground magnetics

The ground magnetic profiles which have been run across a variety of lithologies, rock contacts and mineralization have indicated the following:

The volcanic units within the Rombaken window have a higher magnetic background and show a much stronger variation in the magnetic field than other rock types.

Part of the granites, particularly their contact zones, as well as the gabbroic bodies are detectable on the magnetic profiles because of their generally higher magnetic background and a more varied magnetic expression relative to the sedimentary package.

The large areas of sedimentary rocks, mainly meta-graywackes, show an extraordinary magnetic stability, in itself a diagnostic feature. The weaker pyrite-pyrrhotite dissemination and the thin discrete base metal sulphide zones appear without a magnetic contrast. However, some of the richer iron sulphide zones, for instance at Haugfjellet show weak magnetic anomalies due to a high FeS/FeS₂ ratio.

Magnetic surveys within the Rombaken window are useful as a mapping tool and should be included in any airborne or ground geophysical surveys. Its value in deliniating economic minerlization is still dubious.

A number of new profiles should be run across the southern part of Haugfjellet, the Klubbvann area and at Raudtind.

4.2 Heavy fraction sampling

In spite of a limited program due to lack of time and access the method has outlined two areas with free gold, also confirmed by assays on the heavy fraction material. This has certainly upgraded the Klubbvann and Cunojokka areas and possibly downgraded the Losivann and Durmålsfjellet areas. The two latter had a relatively high sample density. Un-sufficient sampling of rest of the area does not for the moment indicate further target selection based on this method.

A more systematic sampling should be undertaken early next season with sample preparation and examination conducted in the field. This way any anomalous result can be followed up immediately.

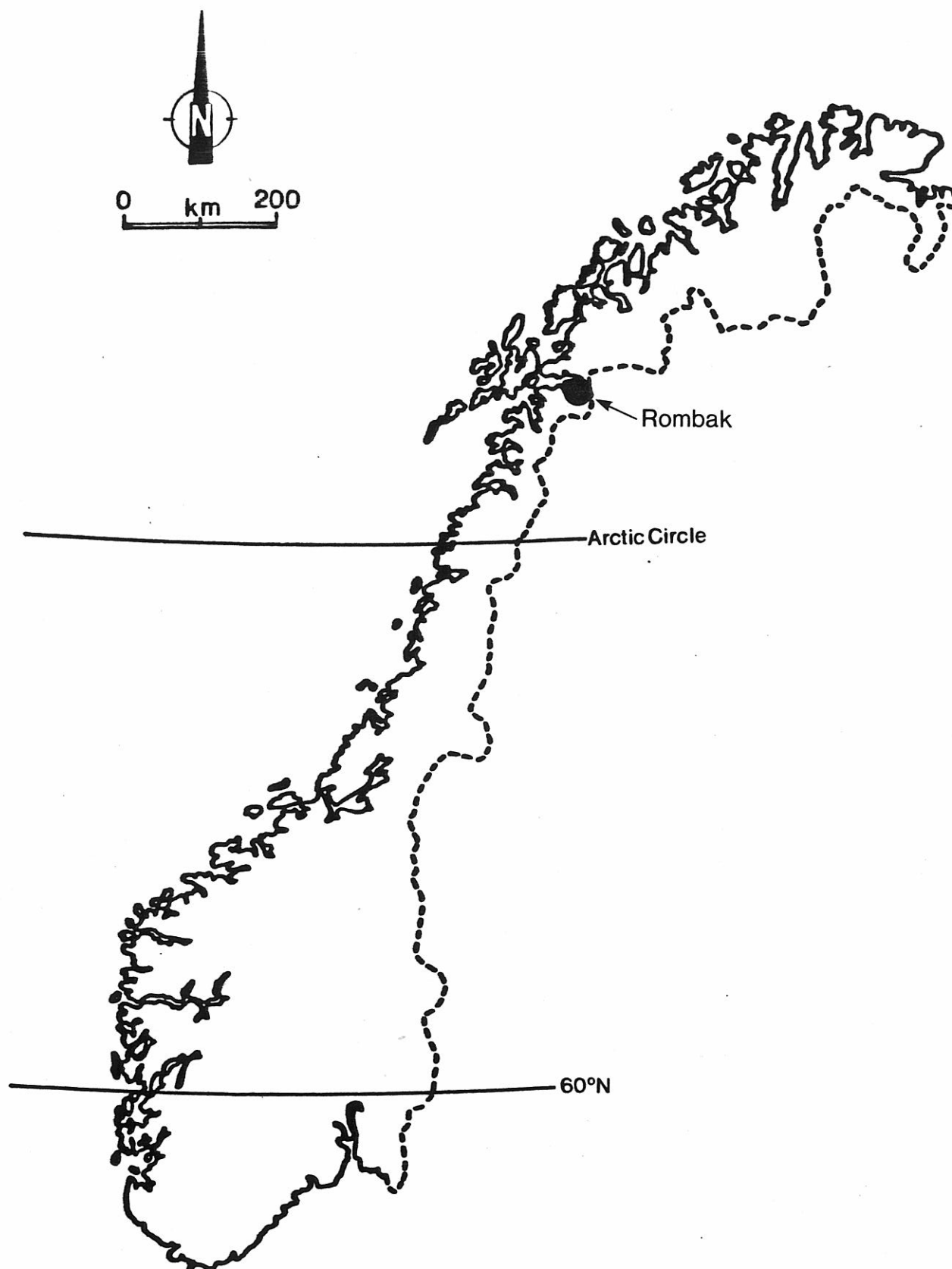
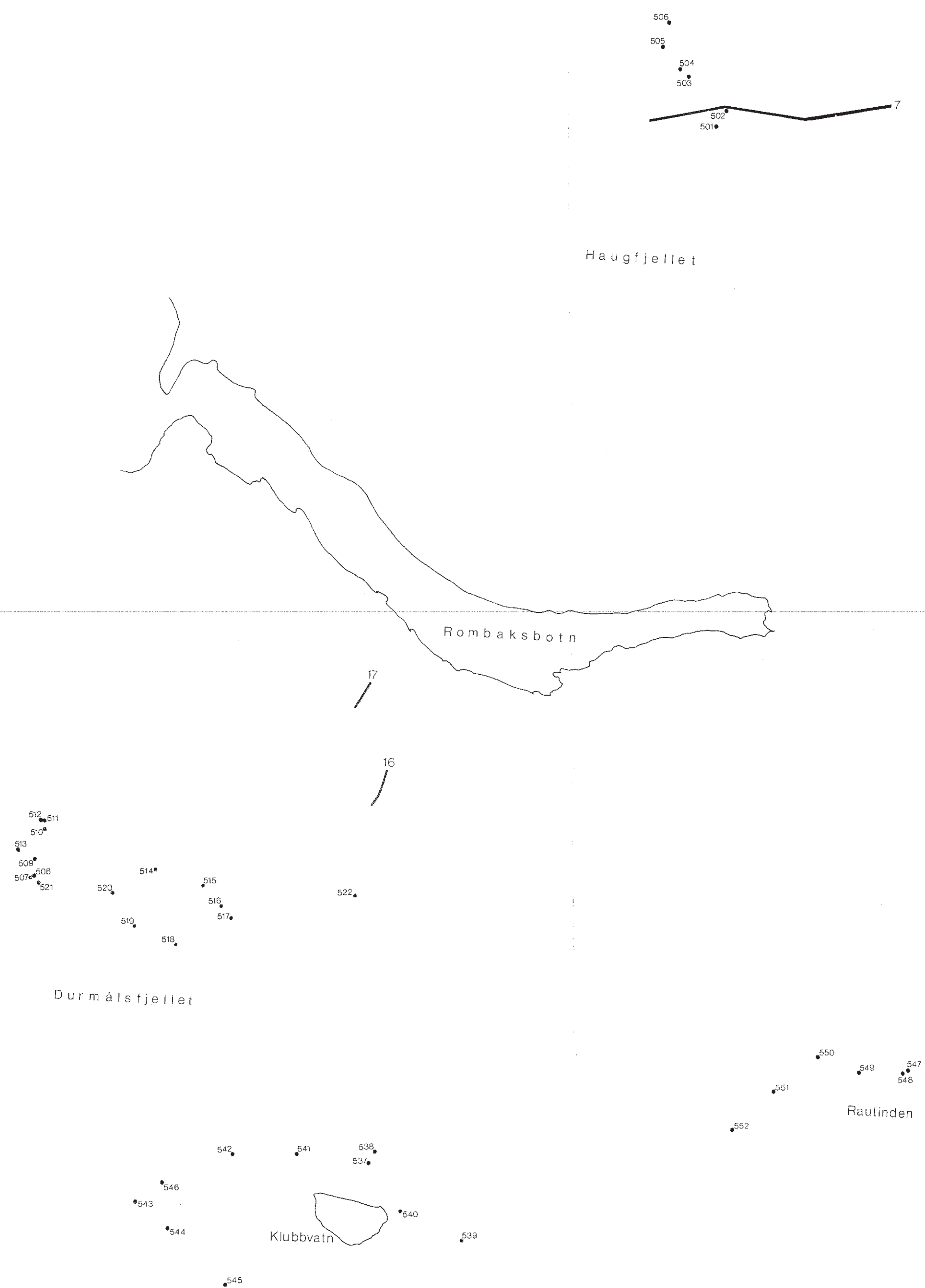


Fig.1

Location Map



LEGEND :



Magnetic profile

• 545

Heavy fraction sample 05/83/545

Fig. 2

 ARCO Norway Inc. Hard Minerals Section				
NARVIK Location of Mag. profiles and Heavy fraction samples.				
Drawn/Traced: PA OS/AA		Date: Dec. 83		Centre: Oslo
Report No: 83-670-5	Project No: 670	Drawing No: 1	Map Sheet: 1431 IV	Scale: 1:50 000

SKJOMDALEN
Magnetic profiles
Stream heavy fraction samples

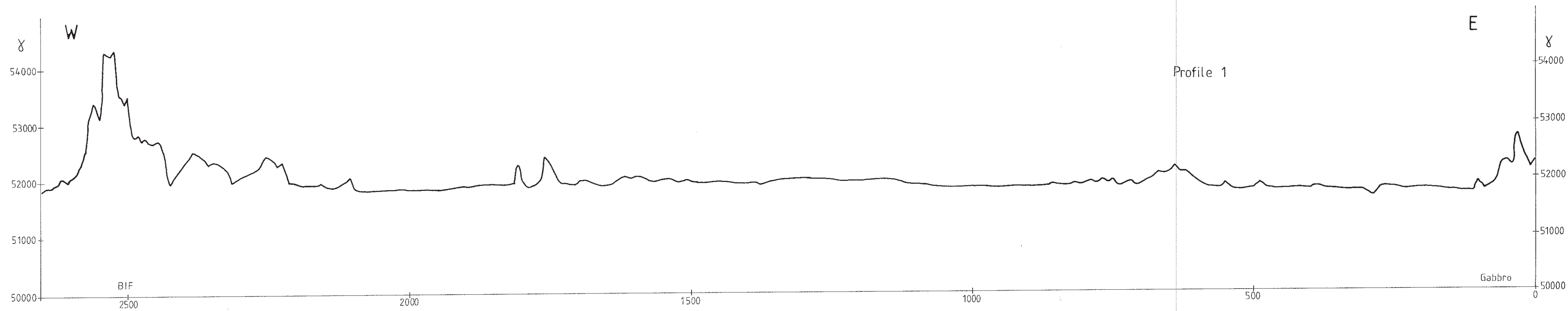
1431 III



LEGEND :
2 Magnetic profile
532 Heavy fraction sample 05/83/532

Fig. 3

 ARCO Norway Inc. Hard Minerals Section				
SKJOMDALEN				
Location of Mag. profiles and Heavy fraction samples.				
Drawn/Traced: PA/AA	Date: Dec, 83	Centre: Oslo		
Report No: 83-670-5	Project No: 670	Drawing No: 2	Map Sheet: 1431 III	Scale: 1:50 000

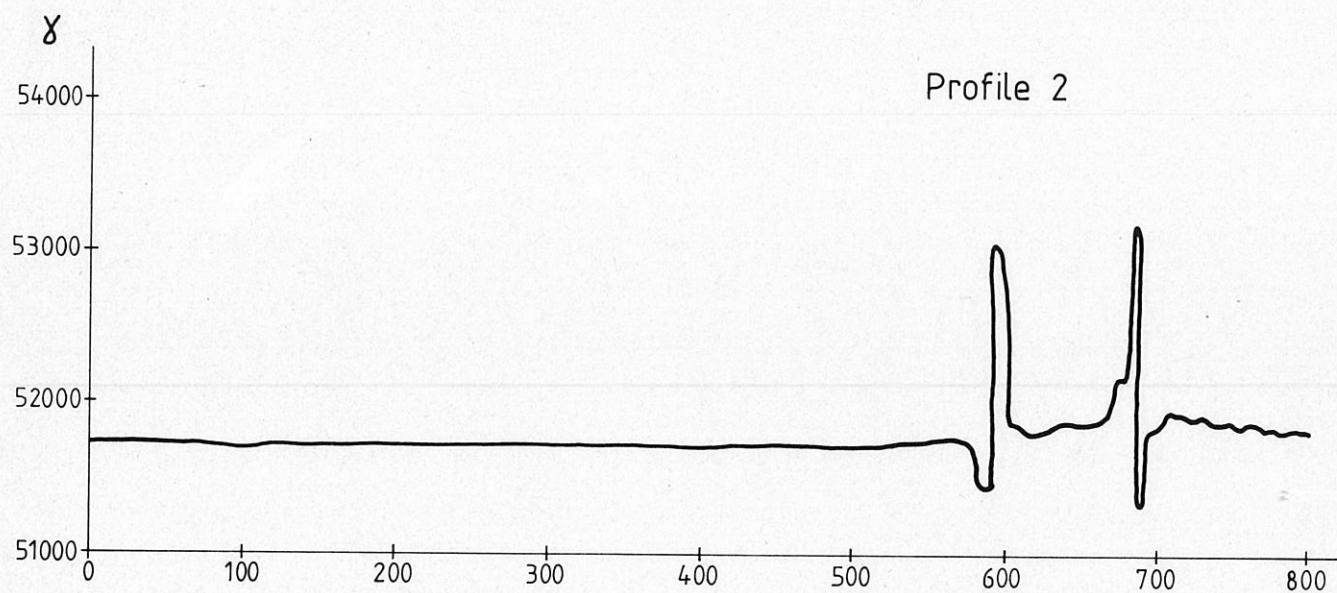
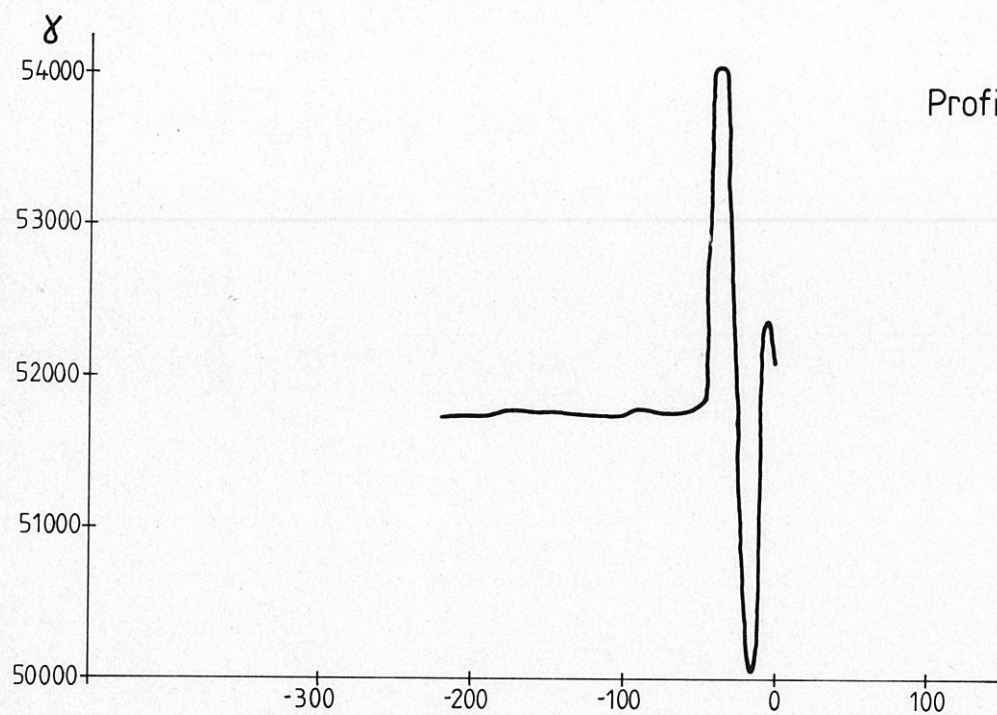


NORDDALEN
Magnetic Profile
1:5000

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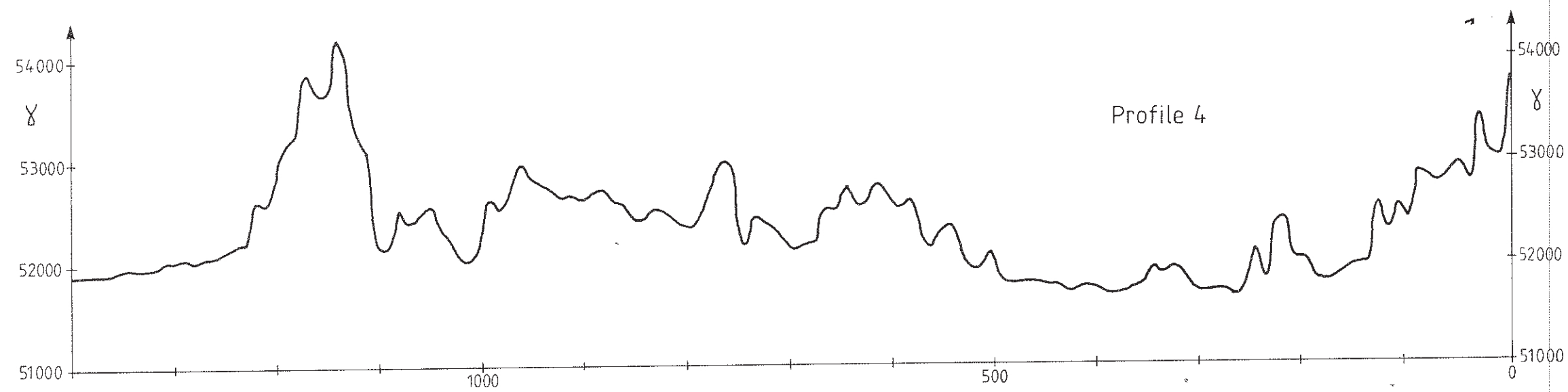
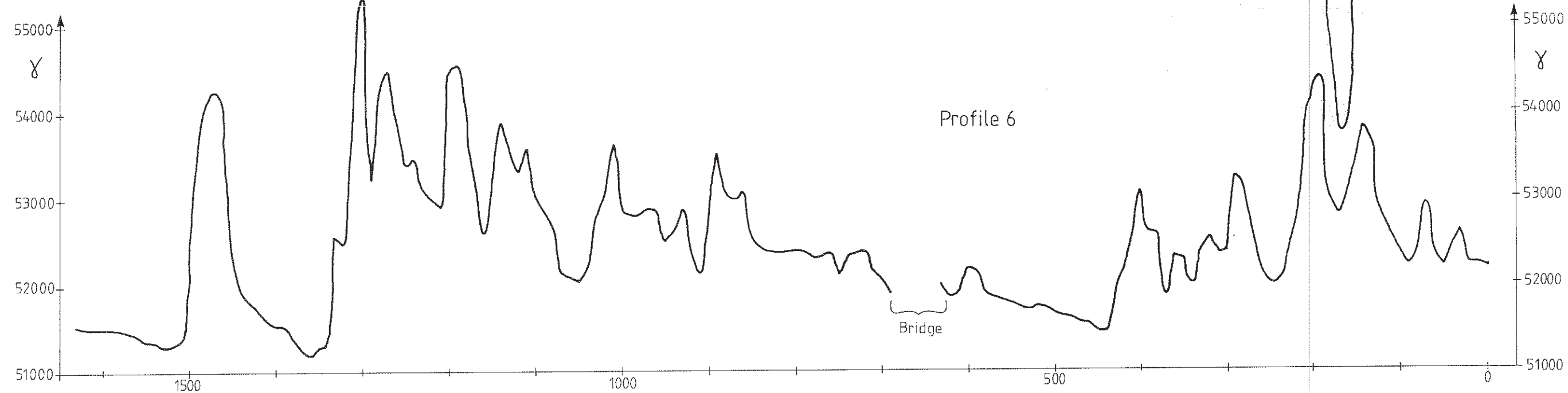
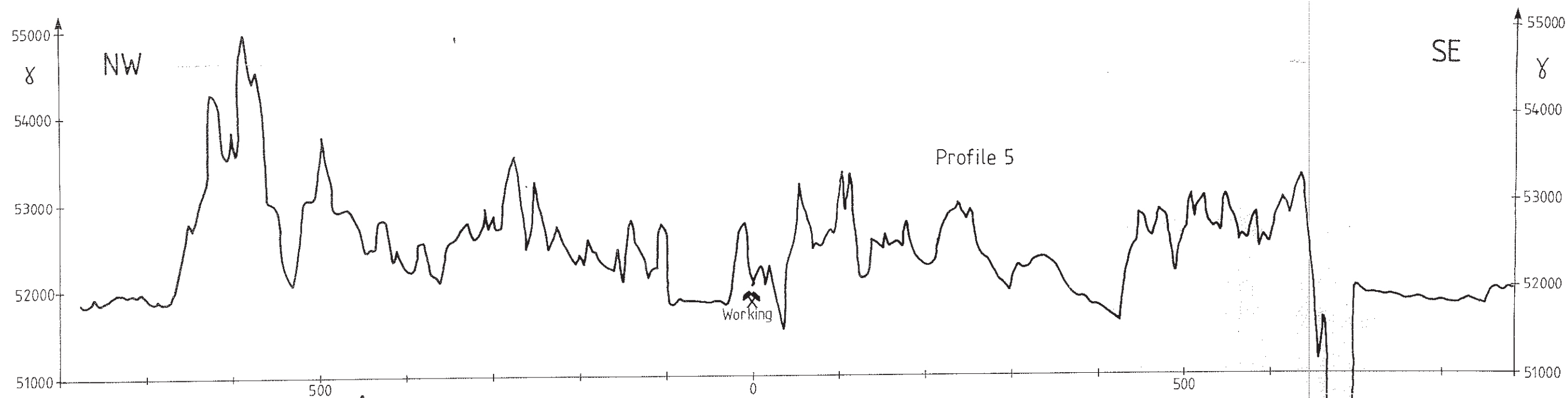
SE

NW

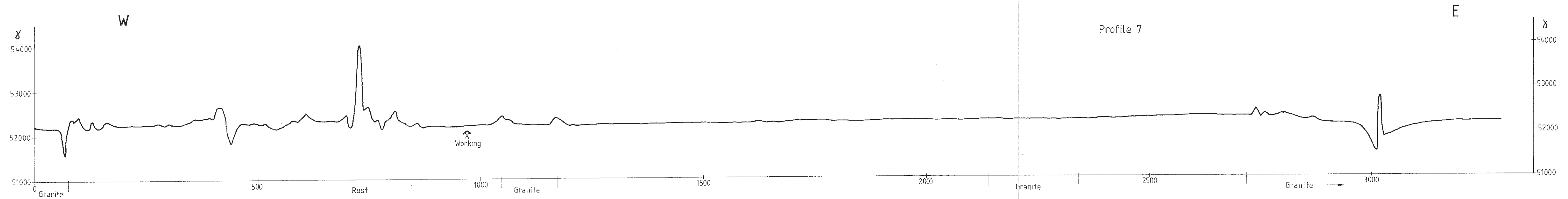


GAUTELISVATNET
Magnetic Profiles
1:5000

P. Abildgaard, Jan. 84

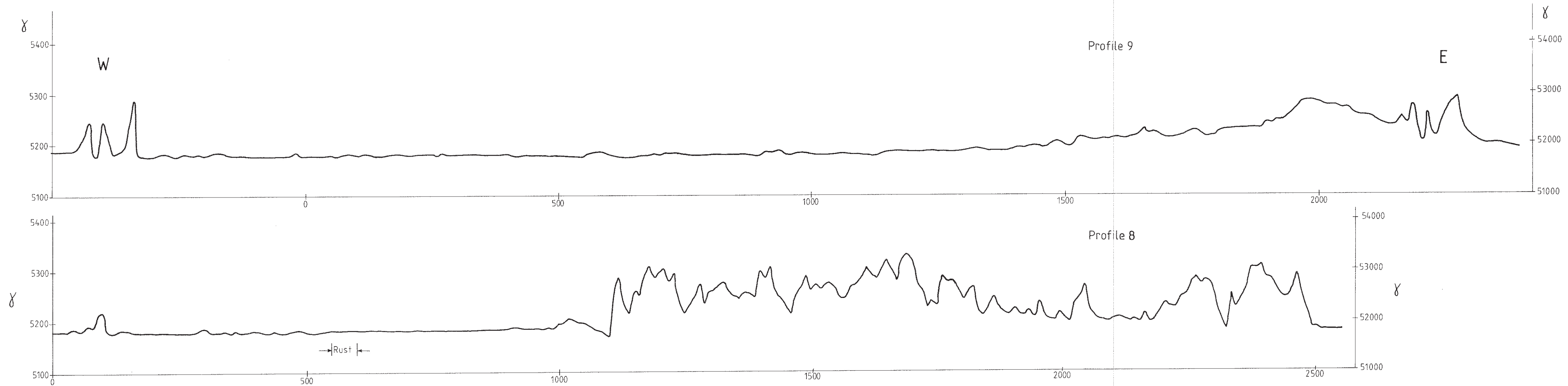


SØRDALEN
Magnetic Profiles
1:5000
P. Abildgaard, Jan. 84

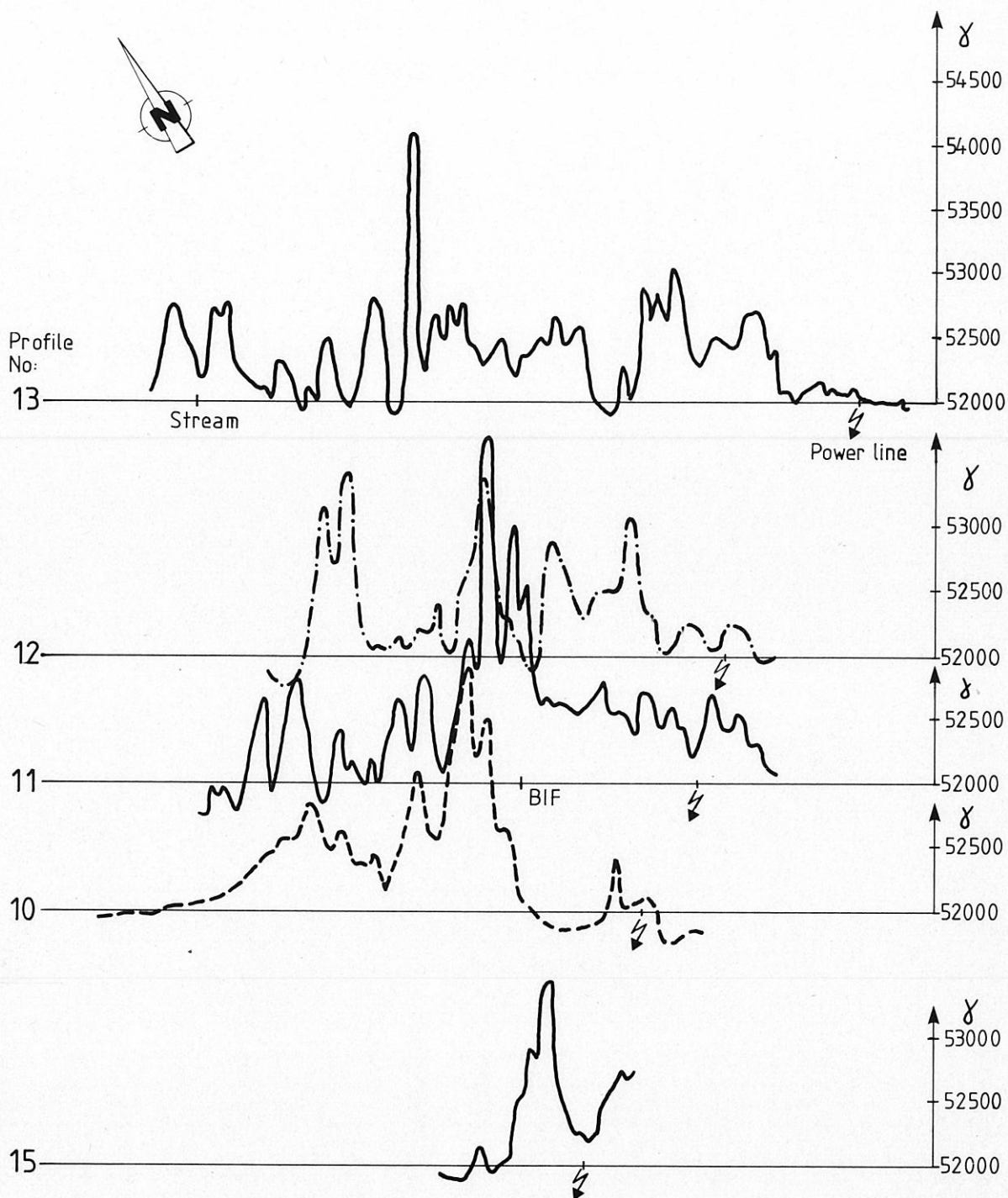


HAUGFJELLET
Magnetic Profile
1:5000

P. Abildgaard, Jan. 84



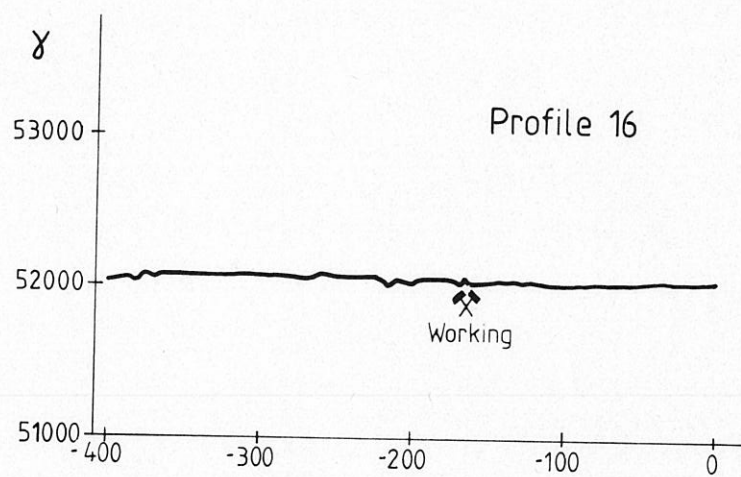
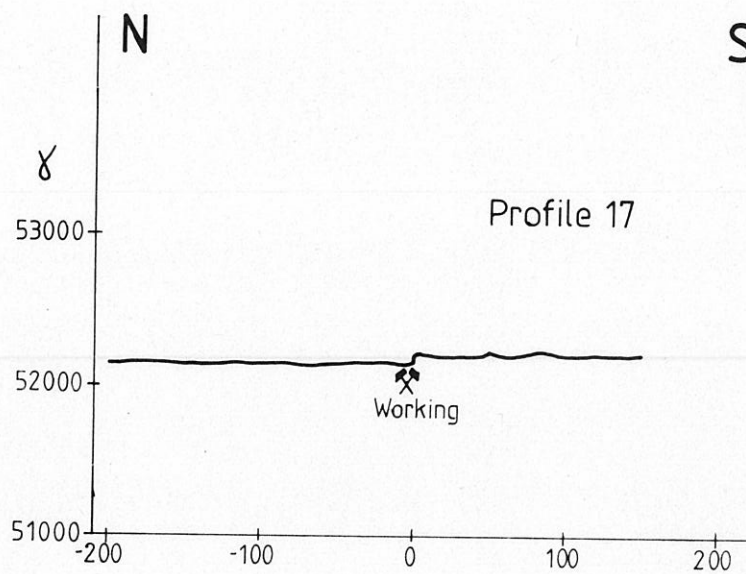
LOSIHYTTEN
Magnetic Profiles
1:5000
P. Abildgaard, Jan. 84



NORDDALEN Magnetic Profiles

1: 5000

P. Abildgaard, Jan. 84



ROMBAKSBOTN
Magnetic Profiles
1:5000

P. Abildgaard, Jan. 84

APPENDIX I

MAGNETIC PROFILES

APPENDIX II

ASSAY RESULTS AND COMMENTS FROM TUCSON AND DENVER

FOR FIELD USE

DATE: 12/2/83
NAME: T. R. K. K.
STATE: Norway
COUNTY: Trondheim
ASSAY LAB: X 528
EXPENSE CODE: 64450
PROJECT NAME:
PROJECT CODE:

SAMPLE PREP. REQUIRED:

ELEMENT(S) OR MENU REQUESTED:

COMMENTS:

"A" Samples
(Heads)

DISPOSITION OF:

REJECTS

() RETURN AFTER 3 MO'S
() RETURN AFTER ASSAY
() DISCARD
() OTHER (SPECIFY)

PULPS

RETURN RESULTS BY:
PAPER COPY
COMPUTER

RETURN RESULTS TO:

Tel:

Sample Field No.		Sample Lab No.		TGR 83-64950-63		Assay Values (ppm Unless Noted)		Au/Ag	
Sample Type		Sample Lab No.		Au/Ag		Au/Ag		Au/Ag	
521	521	04845	04845	1.005	1.1	0.14	✓	335	3785
"	522	04846	04846	1.005	1.22	0.24	✓	120	916
"	523	04847	04847	1.009	1.10	0.65	✓	14	153
"	524	04848	04848	1.007	1.10	0.16	✓	43	1625
"	525	04849	04849	1.010	1.10	0.244	✓	41	409
"	526	04850	04850	1.014	0.10	2.737	✓	74	3.16
"	527	04851	04851	1.005	1.10	12.58	✓	10.4	17.9
"	528	04852	04852	1.010	1.10	0.396	✓	25	1252
"	529	04853	04853	1.010	1.1	12.71	✓	157	0.8
"	530	04854	04854	1.012	1.1	27.8	✓	72	0.4
"	531	04855	04855	1.014	1.10	0.451	✓	31	1221
"	532	04856	04856	1.478	1.16	0.332	✓	6024	481
"	533	04857	04857	1.54	1.1	4.15	✓	482	37
"	534	04858	04858	1.005	1.10	1.41	✓	3.5	170
"	535	04859	04859	1.516	1.23	0.910	✓	2198	567
"	536	04860	04860	1.017	1.10	0.106	✓	160	1943
"	537	04861	04861	1.027	1.10	0.105	✓	66	1246
"	538	04862	04862	1.163	1.10	0.581	✓	280	172
"	539	04863	04863	1.891	1.72	0.109	✓	18349	1605
"	540	04865	04865	1.039	1.10	0.511	✓	3914	76

Au-Ag assays on Goldhound
concentrated material.

FOR FIELD USE

DATE: 12/7/83
NAME: T. Rabin
STATE: Kentucky
COUNTY: _____
ASSAY LAB: Tresson
EXPENSE CODE: X528
PROJECT NAME: _____
PROJECT CODE: 64950

SAMPLE PREP. REQUIRED:

ELEMENT(S) OR MENU REQUESTED:

COMMENTS:

4" Samples (Series 11)

DISPOSITION OF:

	REJECTS	PULPS
()	RETURN AFTER 3 MO'S	()
()	RETURN AFTER ASSAY	()
()	DISCARD	()
()	OTHER (SPECIFY)	()

RETURN RESULTS BY:

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COMPUTER**

RETURN RESULTS TO:

Tel:

Sub Report No.

1

4950-63

(μpm Unless Noted)

[illegible]

DEC 7 1983

DATE SAMPLES RECEIVED:

GEOMETALLURGICAL SAMPLE SUBMITTAL FORM

MINASQUINUA MINERALS COMPANY 4 TGR 83-64950-62

FOR FIELD USE

DATE: 04/11/83
 NAME: T. Rabun
 STATE: Norway
 COUNTY:
 ASSAY LAB: Tugson
 EXPENSE CODE: X 578
 PROJECT NAME:
 PROJECT CODE: 64950

SAMPLE PREP. REQUIRED:

ELEMENT(S) OR MENU REQUESTED:

Ag, As, Au, Co, Cr, Cu, Fe, Pb, Zn

COMMENTS:

"B" Samples

DISPOSITION OF:

REJECTS
 () RETURN AFTER 3 MO'S
 () RETURN AFTER ASSAY
 () DISCARD
 () OTHER (SPECIFY)

RETURN RESULTS BY:

PAPER COPY (✓) To Oslo by Courier
 COMPUTER () To Denver w R226

RETURN RESULTS TO:

T. Rabun
 Arco Norway Inc
 Margelandsveien 7, Oslo 1
 Norway

Tel:

Lab Report No. TGR 83-64950-62 Assay Values (ppm Unless Noted)

Sample Field No.	Sample Lab No.	Au	Ag	As	Co	Cr	Cu	Mo	Pb	W	Zn
04780	501	0.005	0.005	146	13	84	62	13	285	110	155
04781	505	0.005	0.005	40	14	74	54	110	96	110	193
04782	506	0.005	0.005	46	18	61	71	110	134	110	230
04783	509	0.005	0.005	110	24	99	115	110	14	110	120
04784	508	0.007	0.005	110	28	106	714	110	38	110	238
04785	509	0.005	0.005	110	33	171	180	110	110	110	121
04786	510	0.007	0.005	110	29	94	115	110	110	110	142
04787	511	0.009	0.005	110	34	102	154	110	110	110	115
04788	512	0.009	0.005	110	24	88	109	110	12	110	121
04789	513	0.005	0.005	110	25	83	86	110	110	110	108
04790	519	0.009	0.005	110	110	45	25	10	28	110	53
04791	520	0.005	0.005	11	110	102	34	110	33	110	74
04792	521	0.005	0.005	110	22	80	168	110	110	110	84
04793	523	0.009	0.005	110	110	65	25	110	110	110	53
04794	524	0.007	0.005	19	14	55	22	110	15	110	191
04796	526	0.005	0.005	110	110	70	19	110	15	110	48
04797	527	0.014	0.005	110	110	57	110	110	110	110	34
04798	528	0.005	0.005	110	110	56	116	110	110	110	41
04799	529	0.005	0.005	110	110	60	17	110	12	110	35
04800	530	0.010	0.005	110	110	15	110	110	110	110	115

Assays on mixed sieved and panned materials.

GEOMINERALOGICAL SAMPLE SUBMITTAL FORM

DATE SAMPLES RECEIVED: DEC 7 1983

FOR FIELD USE
 DATE: 04/12/83
 NAME: T. Kalyan
 STATE: Norway
 COUNTY: TUESON
 ASSAY LAB: 2528
 EXPENSE CODE: 64950
 PROJECT NAME:
 PROJECT CODE:

SAMPLE PREP. REQUIRED:
 ELEMENT(S) OR MENU REQUESTED:
 Ag, Au, Cu, Pb, Zn

COMMENTS:
 "B" Samples

DISPOSITION OF:

REJECTS
 () RETURN AFTER 3 MO'S
 () RETURN AFTER ASSAY
 () DISCARD
 () OTHER (SPECIFY)

RETURN RESULTS BY:
 PAPER COPY ()
 COMPUTER ()

RETURN RESULTS TO:

Tel: _____

Sample		Lab Report No.		TGR 83-64950-62										Assay Values (ppm Unless Noted)			
Field No.	Type	Sample Lab No.	Assay	Ag	As	Co	CA	Cu	Mo	Pb	W	Zn					
05/83	531	048001	<.005	10.5	14	13	70	26	<10	<10	<10	58					
"	532	048002	<.005	10.5	<10	<10	76	19	<10	13	<10	43					A4
"	534	048003	.009	10.5	<10	<10	20	<10	<10	<10	<10	21					
"	535	048004	<.010	10.5	57	13	96	22	<10	22	<10	108					X
"	536	048005	<.005	10.5	<10	<10	14	<10	<10	14	<10	28					
"	537	048006	.005	10.5	15	<10	87	22	<10	62	<10	88					
"	538	048007	<.005	10.5	11	15	93	18	<10	67	<10	157					X
"	540	048008	.014	10.5	27	<10	92	44	<10	247	<10	202					A4
"	542	048009	Ins.	10.5	<10	<10	49	20	<10	50	<10	72					A4
"	543	048010	<.005	10.5	<10	13	48	27	10	32	<10	111					
"	544	048011	<.005	10.5	22	14	46	26	12	35	<10	189					
"	545	048012	<.005	10.5	<10	11	59	26	<10	30	<10	125					
"	546	048013	Ins.	10.5	18	10	40	116	18	30	<10	106					
"	547	048014	<.005	10.5	<10	<10	29	<10	<10	11	<10	27					
"	548	048015	<.005	10.5	<10	<10	37	<10	<10	24	<10	38					
"	549	048016	<.005	10.5	12	40	37	<10	<10	24	<10	54					
"	550	048017	.007	10.5	<10	<10	18	<10	<10	23	<10	35					X
"	552	048018	.005	10.5	<10	<10	17	<10	<10	<10	<10	25					
"	553	048019	.005	10.5	<10	<10	48	19	<10	29	<10	106					
"	554	048021	<.005	10.5	<10	<10	31	11	<10	12	<10	39					

DATE SAMPLES RECEIVED:

ANALYSTS MINERALS COMPANY **TGA 83-6950-62**
Division of Atlantic B. Electronics, Inc.

FOR FIELD USE		TGA 83-64950-62 Assay Values (ppm Unless Noted)											
DATE: 08/17/83		Sample Field No.	Sample Type	Au	Hg	As	Co	Cr	Cu	Mo	Pb	W	Zn
NAME: T. Kelson	05/83	555	04822	.007	20.5	110	110	28	12	110	17	110	39
STATE: Norway	05/83	556	04823	.007	20.5	110	110	40	110	110	11	110	37
COUNTY: TULSON													
ASSAY LAB: K 578													
EXPENSE CODE: PROJECT NAME:													
PROJECT CODE: 64950													
SAMPLE PREP. REQUIRED:													
ELEMENT(S) OR MENU REQUESTED: Au, Hg, Cu, Pb, Zn													
COMMENTS:													
DISPOSITION OF:													
REJECTS	() RETURN AFTER 3 MO'S	PULPS											
() RETURN AFTER ASSAY	() DISCARD	() OTHER (SPECIFY)											
RETURN RESULTS BY:													
PAPER COPY													
COMPUTER													
RETURN RESULTS TO:													
Tel:													

DEC 7 1983

DATE SAMPLES RECEIVED:

ANALYTICAL SAMPLE SUBMITTAL FORM

ALUMINUM MINING COMPANY TGR 83-64950-62

FOR FIELD USE

DATE: 04/11/83
 NAME: T. Rabun
 STATE: Norway
 COUNTY: Tvedestrand
 ASSAY LAB: X 578
 PROJECT NAME:
 PROJECT CODE: 64950

SAMPLE PREP. REQUIRED:

ELEMENT(S) OR MENU REQUESTED:
 Ag, Au, Cu, Pb, Zn
 COMMENTS: 42
 "B" Samples

DISPOSITION OF:

REJECTS
 () RETURN AFTER 3 MO'S
 () RETURN AFTER ASSAY
 () DISCARD
 () OTHER (SPECIFY)

RETURN RESULTS BY:
 PAPER COPY () To Oslo by Courier
 COMPUTER () To Denver w R226

RETURN RESULTS TO: T. Rabun
 Arco Norway Inc
 Margalandstunet 1, Oslo 1
 Norway

Tel:

Sample		Lab Report No		TGR 83-64950-62 Assay Values (ppm Unless Noted)									
Field No.	Type	Sample Lab No.		Ag	Cu	Au	Pb	Zn	Fe	Mn	Co	Ni	Mo
05/83-	501	04780		10.5	4.003								
"	505	04781		10.5	4.003								
"	506	04782		10.5	4.003								
"	509	04783		10.5	4.003								
"	508	04784		10.5	4.003								
"	509	04785		10.5	4.003								
"	510	04786		10.5	4.003								
"	511	04787		10.5	4.003								
"	512	04788		10.5	4.003								
"	513	04789		10.5	4.003								
"	517	04790		10.5	4.003								
"	520	04791		10.5	4.003								
"	521	04792		10.5	4.003								
"	523	04793		10.5	4.003								
"	524	04794		10.5	4.003								
"	526	04796		10.5	4.003								
"	527	04797		10.5	4.003								
"	528	04798		10.5	4.003								
"	529	04799		10.5	4.003								
"	530	04800		10.5	4.003								



Date: January 12, 1984
Subject: Data on Heavy Metal Separates from Norway
From/Location: L. Holt - Tucson
To/Location: W. Raab - DAT 1635

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JAN 17 1983

GEOCHEMISTRY

A report is attached which provides the gold and silver values for Norway heavy metal separates. Several things should be stated to qualify this data:

1. The actual gold and silver values were obtained by fire assay fusion followed by palladium inquartation and AA analysis. The milligrams of metal were calculated from the AA analysis and have a built-in $\pm 20\%$ variation at the 0.020 milligram level.
2. The lab feels that sample weights in the order of 0.1 to 0.2 grams are not a valid sample size and leads to possible erroneous conclusions. (These are labeled "E" in column 3 on the report.)
3. None of the samples were prepped (pulverized) due to small size. Therefore, a possible variation in sample grain size during the initial fusion may produce corresponding variation in the results (differential fusion).

You are aware of the geologic and geochemical criteria which must be considered. Therefore, it is my feeling that this data should be used only in a qualitative sense. Please forward this data to Tom Robyn with any qualifications you feel are required.


L. Holt, Supervisor
Geoanalytical Laboratory

LH/cmf

Attachments

cc: R. Anderson/file

KW: Norway
Geoanalytical
Precious Metals



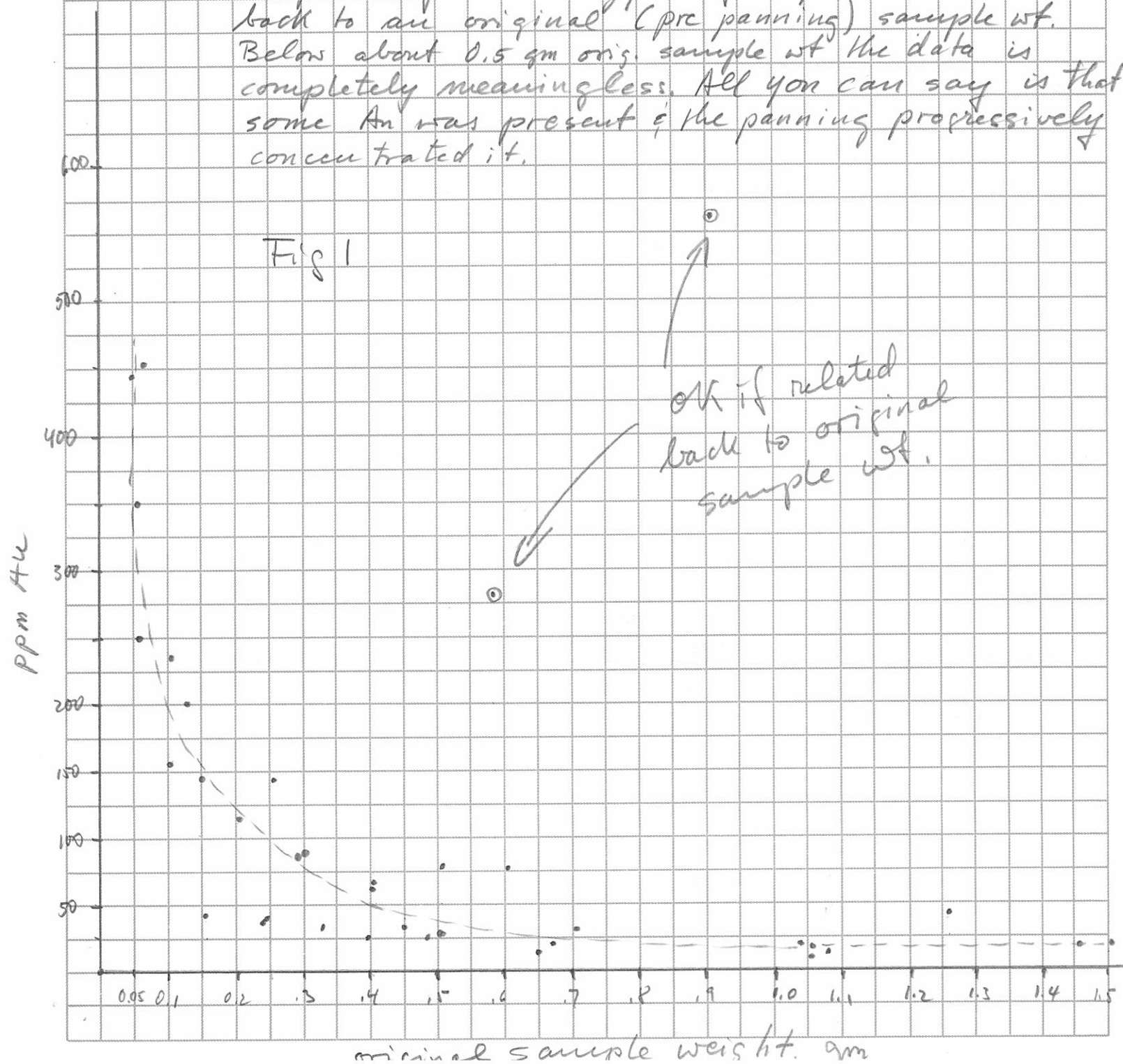
Subject	Page No.	Of
File	By	Date 1/17/84

1 gm

Plotted here are data not marked by ✓ on assay sheet.

In the > 1 gm orig. sample wt samples, the Au values are probably meaningful if they can be related back to an original (pre panning) sample wt. Below about 0.5 gm orig. sample wt the data is completely meaningless. All you can say is that some Au was present & the panning progressively concentrated it.

Fig 1





Subject	Page No.	Of
File	By	Date

x plotted also on fig. 1

Fig. 2

higher wt samples

Please note that I have calculated concentration factors (column 6) assuming 2000 g original sample wt (pre panning, oral comm. Boye) & calculated pre panning gold conc. in the original sediment. Most of the data comes in at 0.005 to 0.015 ppm Au in the unpanned sample suggesting that panning is a good but labor intensive & slow tool. The more you pan the more you concentrate!

Considering analyst uncertainties I would trust a 30 gm sample with a geochem Au = 0.015 ppm more than a 0.07 gm pan concentrate with 442 ppm. (# 05/83-514)

