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THE GEOLOGY OF THE JOMA SULPHIDE DEPOSIT, NORD-TRØNDELAGE NORWAY  
PART II - APPENDIX

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TABLE OF CONTENTS:  
MEAN WHOLE ROCK SILICATE ANALYSES AND MINERAL CONTENTS OF THE JOMA HOST ROCK TYPE LITHOLOGIES AND DISTAL GREENSTONES  
JOMA WHOLE ROCK SILICATE ANALYSES - 1984 SERIES  
JOMA WHOLE ROCK SILICATE ANALYSES - 1985 SERIES  
JOMA DDH-D39 WHOLE ROCK SILICATE ANALYSES AND MINERAL CONTENTS - 1985 SERIES  
JOMA WHOLE ROCK SILICATE ANALYSES - 1986 SERIES  
JOMA WHOLE ROCK SILICATE ANALYSES - 1986 DDH SERIES  
JOMA WHOLE ROCK SILICATE ANALYSES - 1977 SERIES  
JOMA WHOLE ROCK SILICATE ANALYSES - 1974 SERIES  
JOMA ORE TYPE WHOLE ROCK SULPHIDE ANALYSES - 1985 SERIES  
JOMA ORE TYPE WHOLE ROCK SULPHIDE ANALYSES - 1986 SERIES  
PRINT-OUT OF CLUSTER ANALYSES ON DATA FROM 1986 DDH SERIES  
COMPLETE PRINT-OUT OF FACTOR ANALYSES ON DATA FROM 1986, DDH SERIES  
28 VERTICAL GEOLOGICAL PROFILES FOR B1 + B2 + Y + X, MINE PROFILE SERIES SCALE 1:500  
4 HORIZONTAL GEOLOGICAL MAPS FROM LEVELS 375, 402, 480 AND 510 SCALE 1:500

**THE GEOLOGY OF THE JOMA  
SULPHIDE DEPOSIT,  
NORD-TRØNDELAG, NORWAY**

**PART II**

**APPENDIX**

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**1986**



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APPENDIXTABLE OF CONTENTS

TABLE B-1: MEAN WHOLE ROCK SILICATE ANALYSES AND MINERAL CONTENTS OF THE JOMA HOST ROCK TYPE LITHOLOGIES AND DISTAL GREENSTONES.

TABLE B-2: JOMA WHOLE ROCK SILICATE ANALYSES - 1984 SERIES

Host Rock Type Lithologies and Distal Greenstones (28 samples).  
Geol. Inst., NTH - 30 elements, combined XRF, AAS and wet chemical techniques. Plus Semi-quantitative mineral contents (combined XRD and thin section study - Geol. Inst., NTH).

TABLE B-3: JOMA WHOLE ROCK SILICATE ANALYSES - 1985 SERIES

Host Rock Type Lithologies and Distal Greenstones (48 samples).  
Rautaruukki Oy, Finland Analyses - 35 elements XRF + L.O.I.

TABLE B-4: JOMA DDH-D39 WHOLE ROCK SILICATE ANALYSES AND MINERAL CONTENTS - - 1985 SERIES.

Host Rock Type Lithologies (24 samples), Rautaruukki Oy, Finland Analyses (20 elements XRF + L.O.I. + specific gravity). Plus Semi-quantitative mineral contents (combined XRD and thin section study - Geol. Inst., NTH).

TABLE B-5: JOMA WHOLE ROCK SILICATE ANALYSES - 1986 SERIES

Mine Host Rock Type Lithologies and Distal Greenstones (28 samples).  
Rautaruukki Oy, Finland analyses (19 elements XRF + L.O.I.).  
Plus Semi-quantitative mineral contents (combined XRD and thin section study - Geol. Inst., NTH).

TABLE B-6: JOMA WHOLE ROCK SILICATE ANALYSES - 1986 DDH SERIES

Surface Diamond Drill Hole and Mine Host Rock Type Lithologies and Distal Greenstones (355 samples).  
Rautaruukki Oy, Finland Analyses - (19 elements XRF technique + L.O.I.).

TABLE B-7: JOMA WHOLE ROCK SILICATE ANALYSES - 1977 SERIES (J. Olsen).

Distal Greenstones and Host Rock Lithologies (13 samples).  
Geol. Inst., NTH analyses - (23 elements XRF + AAS Techniques).

- TABLE B-8: JOMA WHOLE ROCK SILICATE ANALYSES - 1974 SERIES (G. Gale).  
Distal Greenstones and Host Rock Lithologies (6 samples) NGU Analyses - (19 elements, combined XRF+AAS+wet chemical techniques).
- TABLE C-1: JOMA ORE TYPE WHOLE ROCK SULPHIDE ANALYSES - 1985 SERIES  
(40 samples).  
Bondar-Clegg, Canada Analyses (Rep.no. 115-1509), 35 major trace elements using combined AAS, INNA, XRF and specific wet chemical Techniques, plus specific gravity.
- TABLE C-2: JOMA ORE TYPE WHOLE ROCK SULPHIDE ANALYSES - 1986 SERIES  
(32 samples).  
Bondar-Clegg, Canada Analyses (Rep.no. 016-0559) - 29 major and trace elements using combined AAS, INNA, XRF and specific wet chemical Techniques, plus specific gravity.
- TABLE D-1: PRINT-OUT OF CLUSTER ANALYSES ON DATA FROM 1986 DDH SERIES.
- TABLE D-2: COMPLETE PRINT-OUT OF FACTOR ANALYSIS ON DATA FROM 1986, DDH SERIES.
- TABLE E: 28 VERTICAL GEOLOGICAL PROFILES FOR  $B_1+B_2+Y+X$ .  
MINE PROFILE SERIES (SCALE 1:500).
- TABLE F: 4 HORIZONTAL GEOLOGICAL MAPS FROM LEVELS 375, 402, 480 and 510  
(SCALE 1:500).

APPENDIX A.

## A.1 CHEMICAL AND MINERALOGICAL ANALYTICAL PROCEDURES.

A.1.1 Introduction.

In order to strengthen or modify the classification schemes and to define the chemical and mineralogical variations within the major volcanite units and host rock lithologies and the sulphide ore types within the Joma ore horizon, it was necessary to perform an extensive whole rock, major and trace element analytical program and complementary mineralogical study. A limited number samples of the various rock types were used for the mineralogical study.

A.1.2 Whole Rock Silicate Analytical Techniques.

A total of 454 greenstone and host rock lithology samples were analysed for whole rock silicate major and trace elements at two laboratories.

Twenty-eight of these samples were analysed at the Geologisk Institutt, NTH. Thirty major and trace elements were analysed using a combination of X-ray Fluorescence (XRF), Atomic Absorption (AAS) and wet chemical techniques. Most of the major elements ( $\text{SiO}_2$ ,  $\text{TiO}_2$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{Fe}_2\text{O}_3^{\text{tot}}$ ,  $\text{MnO}$ ,  $\text{MgO}$ ,  $\text{CaO}$ ,  $\text{K}_2\text{O}$  and  $\text{P}_2\text{O}_5$ ) were analysed by XRF using a fused glass button technique, described by Padfield and Grey (1971). Fused International standards and recognized correction factors were used.  $\text{Na}_2\text{O}$  and the trace elements Cu, Zn, Pb, Ag, Ba, V, Cr, Co and Ni were analysed by AAS and Rb, Sr, Y, Zr and Nb were analysed by XRF using pressed powder tablets. Loss of Ignition (L.O.I.) was also performed in connection with the XRF analyses.  $\text{CO}_2$ ,  $\text{H}_2\text{O}^+$  and  $\text{H}_2\text{O}^-$  were analysed by wet chemical, and S by gravimetric techniques. The results from this laboratory are regarded as good, having an accuracy of  $\pm 10\%$  at the 95% confidence level.

Four hundred and twenty-six (426) whole rock samples were analysed by Rautaruukki Oy, Finland during four different analytical series. The first series (48 samples, Table B-3) was performed as a test series in which 35 elements were analysed by XRF and L.O.I. The 35 major and trace elements were all analysed on the same pressed powder tablet. Sulphur was also included in this technique. The procedure used at Rautaruukki is described in the brochure received and includes the use of international standards and correction factors developed by Rautaruukki.

The analytical results using this method are regarded as inferior to the fused button technique and has a  $\pm 15\%$  accuracy at the 95 % confidence level.

The second analytical series performed by Rautaruukki Oy (DDH D39, 24 samples, Table B-4) was analysed for 20 major and trace elements by XRF and L.O.I. (Table B-4). The third series included the 1986 surface DDH series (355 samples) in which 20 major and trace elements were analysed by XRF and L.O.I. (Tables B-5 and B-6).

#### A.1.3 Mineralogical Study - combined XRD and Thin Section Techniques.

A complementary mineralogical study was performed on some selected host rock lithologies and surface greenstone samples to cover the various groups of the Joma volcanostratigraphy. These were studied at the Geologisk Institutt, NTH, using a combined X-ray diffraction (XRD) and thin section (TS) modal analysis technique.

Fine crushed powders for selected rock type samples (total ~~41~~<sup>41</sup>) were pressed onto glass plate holders and run on the XRD at the Geologisk Institutt, NTH. The resulting diffractograms with their diagnostic peak intensities, which represents the crystallographic d-spacings for the individual minerals, were used to calculate the mineral contents for each sample. These were calculated using given factors for each mineral (developed by H. Rueslåtten, pers comm. 1984 at the Geol. Inst., NTH) from standard mineral assemblages. The d-spacing peak intensities (recalculated to area under peak) and the individual mineral factors combine to give a semi-quantitative mineral content for the rock sample. Some of the minerals were difficult to calculate because of interference patterns between reflection from other minerals, i.e. sphene, in low quantities its characteristic peak is covered by reflection lines from quartz. Sulphide minerals were also difficult to calculate at low quantities (<2-3%).

These results were checked and controlled against a limited number of thin section modal analyses. The mineral contents are given along with the whole rock chemical analyses in Tables B-2, B-4 and B-5.

#### A.1.4 Discussion.

Pressed powder tablets are used by Rautaruukki Oy for XRF analysis of both the major and trace elements using the same pressed tablet. This is not recognized to be as accurate as the fused glass button techniques used by both the Geologisk Institutt, NTH and Norges geologiske undersøkelse (NGU) laboratories (T. Grenne, pers. comm. 1984). Therefore, the analyses from Rautaruukki Oy may only be regarded as semi-quantitative, especially at low quantities near the detection limits of the elements involved.

T. Grenne of the Geologisk Institutt, NTH (pers. comm. 1985) has compared the results of 25 greenstone analyses performed by both Rautaruukki Oy and NGU on the same samples and found a good correlation of results for the major elements, except for  $\text{Na}_2\text{O}$ , and for most of the trace elements such as Rb, Sr, and Y, which were generally low in these rock, near the detection limits. The results of the XRF greenstone analyses by Rautaruukki Oy are, therefore, regarded as quite reliable for the comparison of the relative, chemical variations between the rock types.

Four control samples, previously analysed at the Geologisk Institutt, NTH, (1984 series, 28 samples, Table B-2) were reanalysed by Rautaruukki Oy in the 1985 series (48 samples). These show good reproducibility for the major and most of the trace elements. However, the Rautaruukki analyses gave slightly lower values for  $\text{TiO}_2$ , Ba, Co and Y, and higher values for Zr than these obtained by the Geol. Inst., NTH. The results for sulphur obtained by the XRF method from Rautaruukki Oy can not be directly compared with the gravimetric sulphur analyses from the Geologisk Institutt, NTH. The sulphur results from Rautaruukki are far too low and can only be used as an indication of the relative increase and decrease in sulphur contents.

The results from the four whole rock silicate analytical series (see Tables B-2, B-3, B-4, B-5 and B-6) form the basis for all plots and figures on chemical results used in this report. Some earlier whole rock silicate analytical data have also been used in this report. This includes 13 analyses from J. Olsen (1984, produced by Geol. Inst., NTH) and 6 analyses from G. Gale (1974, produced at NGU). These are mostly of distal greenstone samples (see Tables B-7 and B-8).

Olsen had previously (1976-1977) received a large number of whole rock greenstone analyses from both Geol. Inst., NTH and NGU of both surface greenstones and host rocks from within the mine, including chlorite schists, albites and other altered rocks. Unfortunately, these can not be used as host-rock type samples as none of them have been localized (coordinates) within the mine. There is also no guaranti that these are from true lavas, some most likely include tuffs and hyaloclastite material judging from their major and trace elemental distributions.

The surface greenstone samples (JG-77 series, see Table B-7 and Fig. 2.1b.) are, however, useful as their locations are known and there is good control that these represent true lavas, pillows and massive flows.

#### A.1.5 Whole Rock Sulphide Ore Analytical Techniques.

A total of 72 ore type samples from the mine and from the open pit have been analysed for major and trace ore forming elements. These were analysed by Bondar-Clegg of Ottawa, Canada, in two series; 1) 1985 series, 40 samples (Table C-1), and 2) 1986 series, 32 samples (Table C-2).

The ore samples were analysed for 35 elements and specific gravity, using various techniques. Twelve elements (Ag, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, V, Zn) were analysed by a multi-acid solution Atomic Absorption (AAS) method. Samples containing Cu and Zn values exceeding 2 % were reanalysed by Grong Gruber A/S. Grong Gruber A/S also analysed for specific gravity in the 1985 series. Thirteen elements (Au, W, Sb, As, Se, Th, U, Na, Ba, La, Hf, Ta, Ir) were analysed using an Instrumental Neutron Activation method (INNA) included in the Au + 20 elements package, option II. Five elements (Ti, Sn, Rb, Sr, Zr) were analysed by an X-ray Fluorescence (XRF) method and the remaining 4 elements (S, Hg, P and Te) were analysed using specific wet chemical techniques (see Bondar-Clegg 1985 brochure).

These results are regarded as standard geochemical analyses having a  $\pm 10-15$  % accuracy at the 95 % confidence level (see Bondar-Clegg's 1985 brochure for further information regarding analytical techniques and reproducibility of results).

#### A.1.6 Sampling Procedures and Preparation.

Samples for whole rock silicate analyses collected from surface exposures and from within the mine were carefully chosen from recognizable volcanite material, such as central parts of pillows and massive flows and dykes. The samples were, whenever possible, taken as a composite of several small samples over a 1-2 m<sup>2</sup> area, giving a sample totalling approximately 1-2 kg in weight. They were carefully chosen not to include strongly sheared zones showing signs of metamorphic redistribution and layering, strong sulphide veining material or fractures filled with secondary minerals such as epidote, quartz, calcite and chlorite.

The samples taken from the surface drill cores were likewise carefully selected from recognizable lava material. Chloritized pillow rims and hyaloclastite material and sulphide veining and secondary minerals were avoided. Problems arose, however, in sampling areas of strong shearing and in intensely altered zones with much sulphide veining and strong impregnations.

From earlier consultations with T. Grenne, Geol. Inst., NTH, it was agreed that the drill core samples should be taken over a 10 m interval consisting of 5 cm long bits for each meter, thereby, giving a composite sample consisting of 10 bits comprising a sample weighting approximately 1-1,5 kg. The length of the composite sample was shortened or lengthened accordingly, to follow the natural lithological boundaries.

The ore type samples were also taken as composite samples over a larger area wherever possible. They generally represent a sample weighting approximately 2-3 kg.

The samples were washed to clean off any mine dust or contamination. They were hammered to get rid of all visible secondary silicate, and carbonate minerals in fracture filling and concentrations and sulphide veining material. The samples were then coarse crushed in a tungsten-carbide jaw crusher, and split before being fine ground to a powder form in an agate swing mill. All this preparation was carried out at the Geologisk Institutt, NTH, prior to being sending off for chemical analyses, except for the samples from the 1986 surface DDH series (355 samples) that were sent to Rautaruukki as split coarse crushed material.

TABLE A-1: LIST OF MINERAL ABBREVIATIONS AND TERMS USED IN REPORT.

		MINERAL COMP.	DENSITY	HARDNESS
act.	=	actinolite		
amf.	=	amphibole		
chl.	=	chlorite		
(Fe)chl	=	Fe-rich chlorite		
(Mg)chl	=	Mg-rich chlorite		
ab	=	albite + Na plagioclase		
Qtz	=	quartz		
W. mica	=	white mica (+ phengite)		
ser.	=	sericite		
Bio.	=	biotite		
stilp.	=	stilpnomelane		
Cc	=	calcite		
Dol.	=	dolomite		
Ank.	=	ankerite		
ep	=	epidote	(CaFe-rich silicate)	
clinz.	=	clinozoicite	(CaAl-rich silicate)	
sp.	=	sphene		
leuc.	=	leucoxene		
po	=	pyrrhotite		
cp	=	chalcopyrite		
py	=	pyrite		
sl	=	sphalerite		
mt	=	magnetite		
ilm.	=	ilmenite		
gn	=	galena		
cb	=	cubanite		
cob	=	cobaltite		

TABLE A-2 TERMINOLOGIES AND DEFINITIONS.

Leucoxene	A general term for fine grained, opaque, whitish alteration products of ilmenite, commonly consisting mostly of rutile and partly of anatase or sphene, and occurring in some igneous rocks. The term has also been applied to designate a variety of sphene.
Hyaloclastite	A deposit resembling tuff that is formed by the flowing of basalt under water or ice and its consequent granulation or shattering into small, angular fragments, syn. aquagene tuff.
Hyalo	Prefix that is used with rock names to indicate a glassy nature.

APPENDIX B.

## B-1 TABLES OF WHOLE ROCK SILICATE ANALYSES FOR JOMA HOST ROCK LITHOLOGIES AND DISTAL GREENSTONES.

B.1.1 Introduction to Tables of Whole Rock Silicate Analyses.

The whole rock silicate analyses and mineral content tables B-1 to B-8 are set up in such a manner that the rock types (classification scheme used in this report), analysis number of analysing laboratory (GI = Geologisk Institutt, NTH, RR = Rautaruukki Oy, Finland, GG = Grong Gruber A/S and BC = Bondar-Clegg, Canada), sample or locality number from within mine, and the coordinates for each sample are all shown on the tables. In most cases the sample number and locality number may be the same.

The coordinates are given for each sample if possible, except for the drill hole samples, where the meter intervals is given. For the surface samples, both distal and proximal to the Joma mine, the X and Y coordinates given correspond to the new 1:5000 economic topographic map available for the Joma area. The mine samples are given with the XYZ coordinates used for the mine.

The major (%) and trace (ppm) silicate elements are all analysed using XRF except, where stated. Both AAS and wet chemical methods have been used at the Geologisk Institutt, NTH lab. to ensure better results for individual elements.

The rock types given on the tables are from the classification scheme devised for this report (see section 2 and 4):

A	=	pre-ore massive volcanites
B	=	pre-ore pillowed volcanite sequence
B <sub>1</sub> -B <sub>6</sub>	=	pre-ore, altered host rock lithologies series
C <sub>1</sub>	=	post-ore pillowed volcanite sequence
C <sub>2</sub>	=	post-ore volcanoclastics
D	=	distal greenstones

TABLE B-1: MEAN WHOLE ROCK SILICATE ANALYSES AND MINERAL CONTENTS OF THE JOMA HOST ROCK TYPE LITHOLOGICAL AND DISTAL GREENSTONES.

TABLE B-2: JOMA WHOLE ROCK SILICATE ANALYSES - 1984 SERIES.  
Host Rock Type Lithologies and Distal Greenstones (28 samples). Geologisk Institutt, NTH Analyses - 30 major and trace elements, combined X-ray Fluorescence (XRF), atomic absorption (AAS) and wet chemical techniques.  
Plus: Semi-quantitative mineral contents, combined X-ray diffractometry (XRD) and thin section (TS) study - Geologisk Institutt, NTH.

TABLE B-3: JOMA WHOLE ROCK SILICATE ANALYSES - 1985 SERIES.  
Host Rock Type Lithologies and Distal Greenstones (48 samples). Rautaruukki Oy, Finland Analyses - 35 major and trace elements, X-ray Fluorescence (XRF) technique and Loss On Ignition (L.O.I.).

TABLE B-4: JOMA SURFACE DDH.D39 WHOLE ROCK SILICATE ANALYSES AND MINERAL CONTENTS - 1985 SERIES.  
Host Rock Type Lithologies (24 samples). Rautaruukki Oy, Finland Analyses - 20 major and trace elements, X-ray Fluorescence (XRF) technique, Loss On Ignition (L.O.I.) and specific gravity.  
Plus: Semi-quantitative mineral contents, combined X-ray diffractometry (XRD) and thin section (TS) study - Geologisk Institutt, NTH.

TABLE B-5: JOMA WHOLE ROCK SILICATE ANALYSES - 1986 SERIES.  
Mine Host Rock Type Lithologies and Distal Greenstones (28 samples). Rautaruukki Oy, Finland - 19 major and trace elements, X-ray Fluorescence (XRF) technique and Loss On Ignition (L.O.I.).  
Plus: Semi-quantitative mineral contents, combined X-ray diffractometry (XRD) and thin section (TS) study - Geologisk Institutt, NTH.

- TABLE B-6:            JOMA WHOLE ROCK SILICATE ANALYSES - 1986 SURFACE DDH SERIES.  
Joma Host Rock Type Lithologies from surface drill holes, Mine localities and Distal Greenstones (355 samples). Rautaruukki Oy, Finland Analyses - 19 major and trace elements, X-ray Fluorescence (XRF) technique and Loss On Ignition (L.O.I.).
- TABLE B-7:            JOMA WHOLE ROCK SILICATE ANALYSES - 1977 SERIES (J. Olsen).  
Distal Greenstones and Host Rock Lithologies (13 samples). Geologisk Institutt, NTH Analyses - 23 major and trace elements, combined X-ray Fluorescence (XRF) and Atomic Absorption (AAS) and wet chemical techniques.
- TABLE B-8:            JOMA WHOLE ROCK SILICATE ANALYSES - 1974 SERIES (G. Gale).  
Distal Greenstones and Host Rock Lithologies (6 samples). Norges geologiske undersøkelse (NGU) Analyses - 19 major and trace elements, combined X-ray Fluorescence (XRF), Atomic Absorption (AAS) and wet chemical techniques.

TABLE B-1: MEAN WHOLE-ROCK SILICATE ANALYSES AND MINERAL CONTENTS OF THE JOMA HOST-ROCK TYPE LITHOLOGIES AND DISTAL GREENSTONES.



B <sub>2</sub>	B <sub>4</sub>	B <sub>4-b</sub>	B <sub>5</sub>	B <sub>6-a</sub>	B <sub>6-b</sub>
pale, massive ab+ser+po schists pre-ore strong alt. pillows	pale, ab+ser +chl schists + py pre-ore strong alt. 'stringer z.'	pale schists ser+chl+py pre-ore strong alt. distal 'stringer z.'	pale albitite + py pre-ore strong alt. + syn-ore chem.sed.	Mod.dark Q+ab+Bio Chl.schist +cp+po pre-ore strong alt.	layered Chl-ab schist +cp+po+py syn-ore chem.sed.?

HW near ore altered (n=3)		HW near ore (n=19)		HW ore contact (n=3)		HW ore contact (n=3)		HW ore z. (n=4)		HW ore zone (n=2)	
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%	(n=3)		(n=19)		(n=3)		(n=3)		(n=4)		(n=2)	
	X	SD	X	SD	X	SD	X	SD	X	SD	X	SD
SiO <sub>2</sub>	50.00	1.44	46.18	3.39	48.10	4.00	47.35	6.00	53.86	15.88	37.12	2.11
TiO <sub>2</sub>	1.37	0.49	1.16	0.40	1.63	0.46	2.14	0.40	1.72	0.86	1.89	0.24
Al <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	14.72	0.23	17.50	1.78	19.70	0.69	14.70	1.22	11.34	3.20	15.69	1.75
Fe <sub>2</sub> O <sub>3</sub>	9.84	0.58	11.59	2.78	11.04	1.14	14.91	7.07	16.58	6.00	24.04	0.40
MnO	0.10	0.02	0.15	0.07	0.08	0.06	0.05	0.01	0.08	0.03	0.11	0.02
MgO	7.17	1.44	8.98	2.56	7.37	4.78	1.71	1.40	6.54	3.00	8.78	2.67
CaO	6.58	1.91	3.59	2.46	2.46	0.56	3.39	2.63	1.64	0.70	1.51	0.19
Na <sub>2</sub> O	5.10	1.14	3.04	1.21	1.48	0.38	6.65	1.35	2.70	0.69	2.91	1.16
K <sub>2</sub> O	0.41	0.34	1.73	1.14	4.72	0.87	0.56	0.06	0.94	1.39	2.30	0.28
P <sub>2</sub> O <sub>5</sub>	0.42	0.50	0.11	0.04	0.18	0.08	0.36	0.40	0.05	0.03	0.16	0.06
L.O.I.	2.53	0.67	5.70	1.95	7.65	1.35	7.84	0.55	3.79	2.05	4.41	0.05

% S	1.26	0.75	2.69	2.20	4.14	2.04	8.97	4.00	3.33	1.99	3.76	1.99
ppm Cu	254	260	205	159	360	231	397	257	4096	2039	2243	1630
Zn	142	107	1111	1205	3000	3394	1264	779	138	45	202	139
Ba	80	78	115	59	197	50	150	113	148	79	185	49
V	279	37	272	57	417	49	312	166	313	116	466	8
Cr	219	68	316	51	307	21	116	92	137	60	144	9
Ni	102	39	115	43	70	10	64	56	45	40	59	27
Sr	102	76	53	48	17	6	51	18	25	19	20	0
Y	40		19	9	27	6	60	5	21	8	30	14
Zr	98	38	83	33	123	38	217	194	105	19	118	46

%	(n=1)		(n=3)		(n=2)		(n=2)		(n=1)		
act.	14		2	2			0		1	1	0
chl.	22		36	8			13	6	38	9	16
stilp.	0		0				0		0		0
ab	45		34	12			57	2	24	4	23
qtz	0		8	9			tr		9	4	0
Bio.	0		0				tr		tr		30
W.mica	2		3	1			tr		tr		0
cc	6		7	7			0		0		0
ep	0		tr				0		0		0
sp	2		3	1			6		6	1	5
po	6		tr				0		12	7	19
cp	tr		0				0		6	4	4
py	0		7	7			21	3	0		tr
sl	0		tr				tr		0		0
mt	0		0						0		0

blank values =not analysed

B <sub>6-c</sub>	B <sub>6-d</sub>	B <sub>6-e</sub>	B <sub>6-f</sub>	B <sub>H</sub>
Coarse gr. dark Chl.sch. +Bio+po+cp strong alt.	Fine-gr. dark Chl.schist +po+cp pre-ore strong alt. +chem.sed.	Mod. green Chl.+act.sch. + py	Pale (Mg)-chl. +act. schist pre-ore altered	Hyaloclastite altered ch+ab+sp sch. pre-ore altered

	HW ore con. + within ore (n=3)		HW ore contact (n=5)		ore zone distal (n=3)		distal HW deep strat. (n=2)		distal HW deep strat. (n=4)	
	X	SD	X	SD	X	SD	X	SD	X	SD
% SiO <sub>2</sub>	29.13	4.58	37.40	9.00	30.99	2.75	37.62	0.16	42.72	6.52
TiO <sub>2</sub>	1.16		1.54	0.44	1.61	0.57	1.35	0.22	1.44	0.32
Al <sub>2</sub> O <sub>3</sub> <sub>2 3</sub> <sup>tot</sup>	16.96		15.60	2.06	18.47	0.93	15.59	3.06	17.35	3.46
Fe <sub>2</sub> O <sub>3</sub>	30.79	4.02	25.97	4.74	20.56	3.00	14.82	0.08	12.81	1.25
MnO	0.19		0.16	0.04	0.18	0.05	0.15	0.03	0.18	0.02
MgO	10.58	0.82	9.82	2.09	17.47	6.73	18.12	1.57	10.43	2.58
CaO	1.22	0.58	2.07	1.07	1.50	0.67	4.34	1.92	6.80	3.06
Na <sub>2</sub> O	0.46	0.01	1.59	0.48	0.82	0.93	0.35	0.45	1.97	1.52
K <sub>2</sub> O	2.90	3.95	0.02	0.03	0.52	0.77	0.35	0.11	0.93	1.48
P <sub>2</sub> O <sub>5</sub>	0.07		0.14	0.08	0.13	0.10	0.16	0.01	0.14	0.06
L.O.I.	5.89	2.49	6.00	0.93	8.51	1.64	6.35	0.42	4.45	2.30
<hr/>										
% S	2.46	2.22	2.92	1.60	1.01	0.95	0.05	0.07	1.06	1.12
ppm Cu	2208	1524	3538	2744	130	199	70	99	72	44
Zn	506	264	428	213	945	543	355	346	709	1110
Ba	193	136	24	9	140	87	40	14	83	88
V	241	135	382	82	402	158	280	14	321	42
Cr	181	151	224	87	336	92	290	71	408	240
Ni	69	39	42	40	84	31	115	35	150	141
Sr	40	47	48	63	14	5	25	21	122	60
Y	45	35	17	6	35	7	20	0	25	6
Zr	57	45	128	50	110	7	120	14	108	29
<hr/>										
	(n=2)		(n=1)		(n=1)		(n=1)		(n=1)	
act.	0		0		0		5		4	
chl.	40	40	76		93		89		45	
stilp.	0		0		0		0		0	
ab	0		13		0		0		26	
qtz	0		2		0		0		tr	
Bio.	49	54	0		0		0		0	
W.mica	0		0		0		2		4	
cc	0		0		tr		tr		15	
ep	0		0		0		0		0	
sp	8	6	4		4		4		3	
po	6	5	6		0		0		1	
cp	tr		tr		0		0		0	
py	0		0		3		0		0	
sl	0		0		tr		0		0	
mt	0		0		0		0		0	

TABLE B-2:

JOMA WHOLE-ROCK SILICATE ANALYSES - 1984 SERIES

Host-Rock Type Lithologies and Distal Greenstones (28 samples)

Geol. Inst.-NTH .- (30 elements, combined XRF, AAS and wet chemical techniques).

Plus: semi-quantitative mineral contents (combined XRD and thin section study - Geol. Inst., NTH.)

TABLE B-2:

JOMA WHOLE-ROCK SILICATE ANALYSES - 1984 SERIES

Host-Rock Type Lithologies and Distal Greenstones (28 samples)

Geol. Inst.-NTH.- (30 elements, combined XRF, AAS and wet chemical techniques).

Plus: semi-quantitative mineral contents (combined XRD and thin section study - Geol. Inst., NTH.)

	1	2	3	4	5	6	7	8
Rock type	D	D	C <sub>1-b</sub>	C <sub>1-b</sub>	B <sub>H</sub> (?)	C <sub>1</sub>	C <sub>1</sub>	C <sub>1</sub>
Analys. No.	GI 8659	GI 8660	GI 8661	GI 8662	GI 8663	GI 8664	GI 8666	GI 8667
Sample No.	JO 1/84	JO 2/84	JO 3/84	JO 4/84	JO 5/84	JO 6/84	JO 8/84	JO 9/84
Locality No.	Solberg I	Solberg II	382 vf. s.str. 7	382 vf. s.str. 1	382 vf. s.str. 2	Bh 1739 (-39.15m)	Bh 1781 (-3.45m)	Bh 1781 (-9.45m)
Coord. X	Limingen	Limingen	95181	95179	95181.5	95220	94880	94880
Y	Tunnsjø	Tunnsjø	31467	31458	31456			
Z			383.5	384.5	385	520 level	364 synk	
<b>%</b>								
SiO <sub>2</sub>	45.68	44.86	47.56	46.62	48.11	44.53	45.58	47.14
TiO <sub>2</sub>	2.06	2.17	1.17	1.33	1.50	0.91	1.14	0.94
Al <sub>2</sub> O <sub>3</sub>	14.77	15.22	14.41	15.10	16.01	16.13	16.44	14.37
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	11.32	10.70	10.12	11.30	11.01	8.48	9.93	7.08
MnO	0.15	0.14	0.15	0.16	0.12	0.12	0.13	0.11
MgO	10.10	9.96	7.34	8.86	8.33	8.60	10.39	7.38
CaO	6.71	8.75	12.35	10.02	6.01	12.52	9.23	14.52
*Na <sub>2</sub> O	2.99	2.39	2.18	2.30	2.53	1.34	1.99	3.32
K <sub>2</sub> O	0.61	0.60	0.21	0.30	1.34	1.35	0.66	0.35
P <sub>2</sub> O <sub>5</sub>	0.31	0.33	0.10	0.10	0.10	0.07	0.10	0.07
L.O.I.	3.82	4.20	1.91	2.17	2.78	4.34	2.82	5.18
Σ	98.52	99.13	96.94	98.26	97.84	98.39	98.41	100.46
<sup>x</sup> CO <sub>2</sub>	0.52	1.20	1.29	0.06	0.75	2.00	0.22	4.25
<sup>x</sup> H <sub>2</sub> O <sup>+</sup>	3.38	2.70	2.30	2.23	2.31	1.88	2.99	1.24
<sup>x</sup> H <sub>2</sub> O <sup>-</sup>	0.05	0.05	0.04	0.06	0.05	0.05	0.04	0.03
<sup>x</sup> S	0.10	0.06	0.56	1.15	1.73	0.41	0.09	0.08

Rock type	GI 8659	GI 8660	GI 8661	GI 8662	GI 8663	GI 8664	GI 8666	GI 8667
Analys. No.	JO 1/84	JO 2/84	JO 3/84	JO 4/84	JO 5/84	JO 6/84	JO 8/84	JO 9/84
Sample No.	Solberg I	Solberg II	382 vf.	382 vf.	382 vf.	Bh 1739	Bh 1781	Bh 1781
Locality No.			s.str. 7	s.str. 1	s.str. 2	(-39.15m)	(-3.45m)	(-9.45m)

ppm *Cu	28	46	200	119	229	80	78	98
*Zn	76	74	101	119	177	61	64	57
*Pb	12	8	6	13	6	13	8	12
*Ag	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
*Ba	240	220	160	160	240	160	170	150
*V	378	378	297	344	408	230	239	195
*Cr	438	398	476	268	272	326	537	449
*Co	74	68	73	78	76	73	85	82
*Ni	171	165	248	121	111	176	276	232

Sn  
Mo  
W  
Bi  
Sb  
As  
Cl

Th  
U

Rb	< 5	< 5	13	< 5	< 5	<13	< 5	<5
Sr	150	176	270	182	78	165	193	211
Y	25	40	25	50	60	30	25	<25
Zr	120	140	50	60	80	50	60	55
Nb	<30	<30	<30	<30	<30	<30	<30	<30

La  
Ce  
Ta  
Cs

Cd	1.8	1.8	2.4	2.3	2.5	1.9	1.8	2.3
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X = wet chemical analyses

\* = atomic absorption analyses (AAS)

	9	10	11	12	13	14	15
Rock type	C <sub>1</sub>	B <sub>4</sub>	B <sub>H</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>3</sub>	B <sub>2</sub>
Analys. No.	GI 8668	GI 8669	GI 8665	GI 8670	GI 8675	GI 8676	GI 8672
Sample No.	JO-10/84	JO-11/84	JO-7/84	JO-12/84	JO-17/84	JO-18/84	JO-14/84
Locality No.	Bh 1781 (-17.10m)	Bh 1781 (-25.70m)	Bh 1781 (-7.15m)	Bh 1781 (-18.20m)	382 vf. s.str.-5	382 vf. s.str.-12	388 vf. s.str.-1

Coord. X	94880	94880	94880	94880	95175	95173	95183
Y					31451	31402	31357.5
Z	364 synk				383.5	386	388

%							
SiO <sub>2</sub>	48.30	48.05	33.50	41.86	45.49	41.44	50.33
TiO <sub>2</sub>	0.98	0.84	1.73	1.10	1.72	2.26	0.91
Al <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	16.17	16.20	19.78	15.46	15.04	14.41	14.47
Fe <sub>2</sub> O <sub>3</sub>	9.24	6.81	14.43	18.28	14.38	15.03	9.52
MnO	0.09	0.11	0.17	0.12	0.09	0.11	0.09
MgO	8.42	7.62	12.12	7.69	9.08	13.07	8.52
CaO	8.59	7.28	9.60	1.98	3.21	4.60	5.50
*Na <sub>2</sub> O	2.36	3.44	0.47	4.47	5.16	3.19	5.34
K <sub>2</sub> O	1.38	1.55	0.18	0.57	0.17	0.47	0.73
P <sub>2</sub> O <sub>5</sub>	0.06	0.05	0.10	0.07	0.11	0.30	0.08
L.O.I.	2.11	4.81	5.39	7.21	4.74	4.66	1.79

Σ	97.70	96.76	97.47	98.81	99.19	99.28	97.28
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x <sub>CO<sub>2</sub></sub>	0.63	3.22	0.10	0.55	0.20	0.04	0.92
x <sub>H<sub>2</sub>O<sup>+</sup></sub>	1.73	2.19	5.63	2.66	4.31	4.33	1.80
x <sub>H<sub>2</sub>O<sup>-</sup></sub>	0.04	0.04	0.06	0.04	0.02	0.03	0.02
x <sub>S</sub>	1.16	0.35	0.06	7.32	2.62	8.84	2.07

Rock type	GI 8668	GI 8669	GI 8665	GI 8670	GI 8675	GI 8676	GI 8672
Analys. No.	GI 8668	GI 8669	GI 8665	GI 8670	GI 8675	GI 8676	GI 8672
Sample No.	JO-10/84	JO-11/84	JO-7/84	JO-12/84	JO-17/84	JO-18/84	JO-14/84
Locality No.	Bh 1781 (-17.10m)	Bh 1781 (-25.70m)	Bh 1781 (-7.15m)	Bh 1781 (-18.20m)	382 vf. s.str.-5	382 vf. s.str.-12	388 vf. s.str.-1
ppm *Cu	126	97	8	583	177	365	553
*Zn	108	48	105	406	504	439	265
*Pb	10	6	10	64	155	10	6
*Ag	< 1	< 1	< 1	< 1	< 1	< 1	< 1
*Ba	160	170	200	170	180	220	170
*V	256	267	355	272	337	399	248
*Cr	334	306	750	350	317	100	286
*Co	81	57	103	84	93	88	74
*Ni	191	86	361	154	151	78	145
Sn							
Mo							
W							
Bi							
Sb							
As							
Cl							
Th							
U							
Rb	8	7	9	7	< 5	< 5	10
Sr	135	134	147	41	27	31	67
Y	40	30	30	<25	50	70	40
Zr	50	40	90	55	100	235	65
Nb	<30	<30	<30	<30	<30	<30	<30
La							
Ce							
Ta							
Cs							
Cd	3.2	2.7	2.8	4.1	3.6	3.8	3.4

	16	17	18	19	20	21	22	23
Rock type	B <sub>5</sub>	B <sub>5</sub>	B <sub>6-e</sub>	B <sub>6-a</sub>	B <sub>6-a</sub>	B <sub>6-b</sub>	B <sub>6-c</sub>	B <sub>6-c</sub>
Analys. No.	GI 8677	GI 8678	GI 8671	GI 8673	GI 8674	GI 8679	GI 8680	GI 8681
Sample No.	J0-19/84	J0-20/84	J0-13/84	J0-15/84	J0-16/84	J0-21/84	J0-22/84	J0-23/84
Locality No.	382 vf.s. str.-8	382 vf.s. str.-13	Bh 1740 (-6,0m)	388 v.f. s.str.-2	388 v.f. L.o.14	382 vf.s. str.-9	382 vf.s. str.-10	382 vf.s. str.-11

Coord. X	95158	95150		95176	95161	95158	95158	95155.5
Y	31437	31414		31355.5	31380.5	31437	31437	31410.5
Z	384	384.5		390	389.5	384.4	385	385

%								
SiO <sub>2</sub>	44.49	43.29	27.82	40.94	39.46	38.61	34.22	25.35
TiO <sub>2</sub>	2.45	2.27	1.70	1.94	2.85	2.06		
Al <sub>2</sub> O <sub>3</sub>	14.50	13.60	17.62	12.93	15.01	14.45		
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	18.19	19.74	18.03	22.17	20.93	23.75	26.19	32.59
MnO	0.06	0.04	0.23	0.09	0.10	0.09		
MgO	2.92	2.03	25.02	7.97	10.30	6.89	10.71	11.33
CaO	2.03	1.72	1.38	2.18	2.28	1.37	<0.10	1.84
*Na <sub>2</sub> O	5.45	6.38	0.08	3.33	3.20	3.73	0.46	0.47
K <sub>2</sub> O	0.50	0.62	0.13	0.28	0.27	2.50	7.30	1.25
P <sub>2</sub> O <sub>5</sub>	0.19	0.08	0.06	0.05	0.07	0.12		
L.O.I.	7.78	8.42	10.13	5.28	5.77	4.44	3.03	7.54

Σ	98.56	98.19	102.20	97.16	100.24	98.01		
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<sup>x</sup> CO <sub>2</sub>	<0.04	0.10	0.50	0.80	0.55	0.20	0.14	0.30
<sup>x</sup> H <sub>2</sub> O <sup>+</sup>	1.11	1.25	10.30	3.21	5.95	3.02	2.84	7.36
<sup>x</sup> H <sub>2</sub> O <sup>-</sup>	0.09	0.10	0.05	0.02	0.03	0.06	0.16	0.04
<sup>x</sup> S	10.45	12.04	1.11	6.03	3.52	5.17	1.72	4.95



	24	25	26	27	28
Rock type	qtz <sub>mt</sub>	qtz <sub>mt</sub>	L	L	L(pure)
Analys. No.	GI 8682	GI 8683	GI 8684	GI 8685	GI 8686
Sample No.	J0-25/84	J0-26/84	J0-27/84	J0-28/84	J0-29/84
Locality No.	382 vf.s. str.-4	Bh 1779 (21.55m)	382 vf.s. str.-3	Bh 1739 (23.15m)	Bh 1739 (23.75m)

Coord. X	95176	95179
Y	31451	31458
Z	385.5	386

%					
SiO <sub>2</sub>	54.43	81.96	0.62	1.36	0.29
TiO <sub>2</sub>	0.12	0.03	0.02	0.04	0.02
Al <sub>2</sub> O <sub>3</sub>	4.74	3.66	0	0	0
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	29.93	9.93	1.89	2.37	0.95
MnO	0.11	0.06	0.09	0.19	0.26
MgO	0.40	0.45	0.92	1.82	0.88
CaO	3.02	4.86	53.06	50.98	54.74
*Na <sub>2</sub> O	0.32	0.00	0.24	0.34	0.08
K <sub>2</sub> O	0.43	0.19	0.16	0.08	0.16
P <sub>2</sub> O <sub>5</sub>	0.14	0.02	tr.	tr.	tr.
L.O.I.	1.72	1.93	39.64	39.32	42.67

Σ	98.36	102.64	96.64	96.50	100.05
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<sup>x</sup> CO <sub>2</sub>	1.63	4.15	40.80	35.80	40.60
<sup>x</sup> H <sub>2</sub> O <sup>+</sup>	1.79	0.33	0.65	0.60	0.94
<sup>x</sup> H <sub>2</sub> O <sup>-</sup>	0.64	0.05	0.03	0.03	0.03
<sup>x</sup> S	4.53	1.26	0.21	0.20	0.03

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Rock type

Analys. No.	GI 8682	GI 8683	GI 8684	GI 8685	GI 8686
Sample No.	J0-25/84	J0-26/84	J0-27/84	J0-28/84	J0-29/84
Locality No.	382 vf.s. str.-4	Bh 1779 (21.55m)	382 vf.s. str.-3	Bh 1739 (23.15m)	Bh 1739 (23.75m)

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ppm *Cu	1142	8	332	143	14
*Zn	912	6	173	257	14
*Pb	28	10	66	72	46
*Ag	< 1	< 1	< 1	< 1	< 1
*Ba	190	190	<50	<50	<50
*V	98	20	20	20	20
*Cr	59	<10	<10	<10	<10
*Co	20	8	29	22	24
*Ni	24	6	27	36	30

Sn

Mo

W

Bi

Sb

As

Cl

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Th

U

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Rb	< 5	< 5	< 5	< 5	< 5
Sr	94	72	452	184	254
Y	<25	<25	<25	<25	<25
Zr	<10	<10	<10	<10	<10
Nb	<30	<30	<30	<30	<30

La

Ce

Ta

Cs

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Cd	5.5	0.2	6.4	7.4	6.0
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Semi-quantitative mineral contents from combined thin sections and XRD.

TS= thin section.

No.:	1	2	3	4	5	6	7	8
Analyses	TS.		TS.					
Sample	JO-1/84	JO-2/84	JO-3/84	JO-4/84	JO-5/84	JO-6/84	JO-8/84	JO-9/84
Local	Solb.I	Solb.II	382 vf. s.str.7					

%								
act	11	11	17	15	13	18	14	9
Chl	43	44	22	17	18	21	35	14
ab	31	24	19	37	44	23	28	38
qtz	0	0	4	0	0	1	0	2
W.mica	2	2	0	0	10	6	3	tr.
Bio	0	0	0	0	0	0	0	0
stilp	0	0	0	0	0	0	0	0
cc	4	8	4	1	1	14	tr.	22
Dol	0	0	0	0	0	0	0	0
Ank	0	0	0	0	0	0	0	0
ep	1	5	28	21	3	13	18	14
sp	5	5	3	3	4	2	3	2
po	tr.	tr	2	3	5	1	tr.	tr.
cp	0	0	0	0	0	0	0	0
py	0	0	0	0	0	0	0	0
sl	0	0	0	0	0	0	0	0
mt	0	0	0	0	0	0	0	0

NB! ep = epidote + clinozoicite

sp = sphene + leucoxene

0 = not determined

No.:	9	10	11	12	13	14	15
Analyses			TS.	TS.		TS.	TS.
Sample	J0-10/84	J0-11/84	J0-7/84	J0-12/84	J0-17/84	J0-18/84	J0-14/84
Local						382 vf.	388 vf.
						s.str.12	s.str.1

%							
act	10	4	0	1	3	8	14
Chl	30	26	60	40	32	43	22
ab	29	45	6	35	51	23	45
qtz	tr.	tr.	0	5	tr.	0	0
W. mica	7	4	0	2	0	0	2
Bio	0	0	0	0	0	0	0
stilp	0	0	0	0	0	0	0
cc	9	15	0	1	0	0	6
Do1	0	0	0	0	0	0	0
Ank	0	0	0	0	0	0	0
ep	10	0	30	0	0	0	0
sp	2	2	4	3	4	6	2
po	3	1	tr.	0	7	20	6
cp	0	0	0	0	0	1	0
py	0	0	0	14	0	0	0
sl	0	0	0	0	0	0	0
mt	0	0	0	0	0	0	0



	24	25	26	27	28
No.:					
Analyses					
Sample	J0-25/84	J0-26/84	J0-27/84	J0-28/84	J0-29/84
Local.					

%					
act	0	0	0	0	tr
Chl	0	0	c. 2	c. 4	0
ab	0	0	0	0	0
qtz	40	81	0	0	0
W.mica	0	0	0	0	0
Bio	0	0	0	0	0
stilp	14	tr	0	tr	0
cc.	9	9	c.97	c.93	99
Dol	0	0	0	0	0
Ank	0	0	0	0	0
ep	0	0	0	0	0
sp	0	0	0	0	0
po	12	3	0	0	0
cp	0	0	0	0	0
py	0	0	tr.	c. 2	0
sl	0	0	0	0	0
mt	22	9	0	0	0

TABLE B-3: JOMA WHOLE ROCK SILICATE ANALYSES - 1985 SERIES:

Host-Rock Type Lithologies and Distal Greenstones (48 samples).

Rautaruukki Oy, Finland Analyses - (35 elements XRF + Loss On Ignition).

TABLE B-3:

JOMA WHOLE ROCK SILICATE ANALYSES - 1985 SERIES:

→ Host-Rock Type Lithologies and Distal Greenstones (48 samples).

Rautaruukki Oy, Finland Analyses - (35 elements XRF + Loss On Ignition).

Rock type	Serpentine	D <sub>2</sub>	A	B(?)	D	D	C <sub>1</sub>	C <sub>1</sub>
Analys. No.	RR8501	RR8502	RR8503	RR8504	RR8505	RR8506	RR8508	RR8609
Sample No.	JD-0/84	JD-2/84	JD-5/84	JD-7/84	JD-8/84	JD-9/84	JD-10/84	JD-13/84
Locality No.								
Coord. X	765415	297.5	763000	761200	761500	765430	763920	763790
Y	30045	618	31690	31235	32000	34157	31635	31770
Z		surface				Orklumpen	surface	surface
<b>%</b>								
SiO <sub>2</sub>	41.70	48.21	49.78	50.04	46.11	46.75	46.08	45.75
TiO <sub>2</sub>	0.45	0.69	1.54	1.00	1.79	2.04	1.09	0.96
Al <sub>2</sub> O <sub>3</sub>	4.93	15.86	13.37	13.64	15.04	14.73	14.29	16.15
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	14.24	9.78	11.40	9.98	10.75	11.84	9.61	10.30
MnO	0.15	0.14	0.15	0.14	0.15	0.17	0.14	0.14
MgO	31.24	7.68	9.00	7.77	8.49	7.35	7.42	10.26
CaO	0.77	10.97	6.72	10.80	8.84	8.75	13.39	9.96
Na <sub>2</sub> O	0.00	3.22	3.78	2.60	2.93	3.42	2.96	2.27
K <sub>2</sub> O	0.01	0.03	0.31	0.97	0.70	0.47	0.02	0.55
P <sub>2</sub> O <sub>5</sub>	0.07	0.13	0.23	0.10	0.43	0.49	0.12	0.11
L.O.I.	9.58	6.80	2.22	1.71	2.35	2.22	1.87	2.87
Σ	103.14	103.51	98.50	98.75	97.58	98.23	96.99	99.32
CO <sub>2</sub>								
H <sub>2</sub> O <sup>+</sup>								
H <sub>2</sub> O <sup>-</sup>								
S	0.16	0.01	0.01	0.01	0.01	0.01	0.23	0.07

## Rock type

Analys. No.	RR8501	RR8502	RR8503	RR8504	RR8505	RR8506	RR8508	RR8609
Sample No.	JD-0/84	JD-2/84	JD-5/84	JD-7/84	JD-8/84	JD-9/84	JD-10/84	JD-13/84
Locality No.								

ppm Cu	50	50	20	30	50	10	100	90
Zn	100	60	110	70	80	90	60	80
Pb	10	10	0	10	10	10	10	10
Ag								
Ba	40	10	30	50	60	50	20	40
V	110	240	310	240	320	360	240	220
Cr	1310	140	140	200	340	240	300	310
Co	100	30	30	40	40	40	40	40
Ni	1200	30	60	80	150	110	110	150
Sn	10	0	10	10	10	10	10	10
Mo	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0
Bi	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0
As	100	0	30	0	10	0	10	90
Cl	0	0	0	0	0	0	0	0

Th	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0

Rb	0	0	0	10	10	10	0	0
Sr	20	250	70	190	200	280	220	120
Y	0	10	40	20	20	30	10	20
Zr	50	60	230	70	190	210	100	80
Nb	0	0	10	0	20	20	0	0
La	0	0	0	0	0	0	0	0
Ce	0	0	20	0	30	40	10	0
Ta	0	0	0	0	0	0	0	0
Cs	20	20	20	10	10	30	10	10

x blank value = not analysed

Rock type	C <sub>1</sub>	C <sub>1</sub>	C <sub>1</sub> (B <sub>1-b</sub> ?)	C <sub>2</sub>	C <sub>1-b</sub>	B <sub>H</sub>	B <sub>1</sub>	B <sub>1</sub>
Analys. No.	RR8510	RR8511	RR8512	RR8513	RR8514	RR8515	RR8516	RR8518
Sample No.	JD-14/84	JD-17/84	JD-20/84	362TV(3)	388 vf. s. st	JD-16.b/84	JD-18/84	JD-19.a/84
Locality No.					5			

Coord. X	763685	763360	763565	94881.5	951855	763735	763395	763450
Y	31825	31575	31695	31490	313880	31730	31675	31715
Z				363	387			

%								
SiO <sub>2</sub>	45.49	45.70	48.35	44.35	47.69	42.93	43.12	45.59
TiO <sub>2</sub>	0.92	1.21	0.85	0.99	1.12	1.09	1.92	1.75
Al <sub>2</sub> O <sub>3</sub>	15.90	15.66	15.21	14.91	13.94	15.20	13.05	14.53
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	10.05	9.97	8.97	9.91	11.11	12.13	13.00	13.26
MnO	0.14	0.12	0.13	0.14	0.16	0.21	0.18	0.17
MgO	10.14	8.77	10.07	10.27	8.41	13.07	5.94	7.28
CaO	9.97	11.12	10.23	12.07	10.66	7.22	11.39	9.23
Na <sub>2</sub> O	2.65	2.65	2.40	2.43	3.26	1.11	3.67	3.66
K <sub>2</sub> O	0.08	0.65	0.91	0.14	0.03	0.35	0.05	0.03
P <sub>2</sub> O <sub>5</sub>	0.09	0.14	0.09	0.11	0.12	0.11	0.35	0.25
L.O.I.	2.71	1.69	1.81	1.56	2.12	4.84	3.61	2.03
Σ	98.14	97.68	99.02	96.88	98.62	98.26	96.28	97.78

CO <sub>2</sub>								
H <sub>2</sub> O <sup>+</sup>								
H <sub>2</sub> O <sup>-</sup>								
S	0.10	0.24	0.01	0.28	0.26	1.16	0.38	0.40

## Rock type

Analys. No.	RR8510	RR8511	RR8512	RR8513	RR8514	RR8515	RR8516	RR8518
Sample No.	JD-14/84	JD-17/84	JD-20/84	362TV(3)	388 vf.s.st	JD-16.b/84	JD-18/84	JD-19.a/8

5

## Locality No.

ppm Cu	90	110	30	120	110	80	70	100
Zn	70	70	70	130	70	2370	100	110
Pb	10	10	10	10	10	1790	10	10
Ag								
Ba	10	50	50	20	10	20	20	10
V	210	250	180	210	270	260	370	340
Cr	300	320	280	460	220	300	130	200
Co	40	40	40	40	40	40	40	40
Ni	130	110	140	200	60	80	40	70
Sn	10	10	10	10	10	10	10	10
Mo	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0
Bi	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0
As	200	30	0	10	0	40	0	10
Cl	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0
Rb	0	10	10	0	0	0	0	0
Sr	140	220	100	190	220	100	250	190
Y	20	20	10	10	10	20	30	30
Zr	80	110	80	90	100	90	190	150
Nb	0	0	0	0	0	0	0	0
La	0	0	0	0	0	0	0	0
Ce	10	0	10	0	0	0	20	10
Ta	0	0	0	0	0	0	0	0
Cs	0	20	10	10	20	0	20	0

Rock type	B <sub>H</sub>	B <sub>1</sub>	B <sub>1</sub>	B <sub>1</sub>	B <sub>H</sub>	B <sub>4-b</sub>	B <sub>4-b</sub>	B <sub>4-b</sub>
Analys. No.	RR8519	RR8520	RR8521	RR8522	RR8523	RR8524	RR8525	RR8526
Sample No.	JD-19.b/84	JD-21/84	JD-22/84	JD-23/84	JD-26/84	JD-29/84	JD-31.b/84	362 vf -2.b

Locality No.

Coord.	X	763450	763625	763640	763705	763705	763678	763690	94929
Y		31715	31625	31665	31690	31747.5	31770	31765	31403
Z		surface					open pit	open pit	365

%									
SiO <sub>2</sub>		48.18	49.57	48.69	46.65	46.27	48.64	51.87	43.80
TiO <sub>2</sub>		1.69	1.05	1.61	1.34	1.26	1.84	1.94	1.10
Al <sub>2</sub> O <sub>3</sub>		13.65	14.13	14.02	15.25	20.76	19.74	18.99	20.36
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>		13.11	11.03	11.04	10.51	11.58	12.33	10.15	10.64
MnO		0.17	0.14	0.14	0.13	0.18	0.04	0.06	0.15
MgO		7.68	5.58	5.10	6.75	8.84	4.12	5.12	12.86
CaO		7.93	8.87	10.19	10.99	2.46	1.90	2.47	3.01
Na <sub>2</sub> O		3.91	4.59	4.37	3.67	2.38	1.62	1.76	1.05
K <sub>2</sub> O		0.04	0.06	0.06	0.08	3.14	5.45	4.94	3.76
P <sub>2</sub> O <sub>5</sub>		0.23	0.22	0.25	0.17	0.12	0.20	0.25	0.10
L.O.I.		1.14	1.09	1.53	1.49	6.43	9.17	7.19	6.58
Σ		97.73	96.33	97.00	97.03	103.43	105.05	104.74	103.41

CO <sub>2</sub>									
H <sub>2</sub> O <sup>+</sup>									
H <sub>2</sub> O <sup>-</sup>									
S		0.43	0.14	0.25	0.03	2.60	6.06	4.36	1.99

## Rock type

Analys. No.	RR8519	RR8520	RR8521	RR8522	RR8523	RR8524	RR8525	RR8526
Sample No.	JD-19.b/84	JD-21/84	JD-22/84	JD-23/84	JD-26/84	JD-29/84	JD-31.b/84	362 vf

-2.b

## Locality No.

ppm Cu	90	70	80	30	110	600	140	340
Zn	110	90	90	90	250	6880	580	1540
Pb	10	10	10	10	10	20	300	50
Ag								
Ba	10	20	10	0	100	190	150	250
V	340	310	330	290	330	450	440	360
Cr	200	200	210	310	380	290	300	330
Co	40	40	40	30	50	40	40	30
Ni	70	80	80	120	90	60	80	70
Sn	10	10	10	10	0	20	10	10
Mo	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0
Bi	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0
As	10	0	0	10	130	230	160	50
Cl	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0
Rb	0	0	0	0	20	30	20	30
Sr	190	120	180	170	50	20	20	10
Y	30	30	30	20	20	30	30	20
Zr	150	140	140	120	100	140	150	80
Nb	0	0	0	0	0	0	0	0
La	0	0	0	0	0	0	0	0
Ce	10	0	10	0	20	10	10	0
Ta	0	0	0	0	0	0	0	0
Cs	0	20	20	10	0	20	0	10

Rock type	B <sub>4</sub>	C <sub>1-b</sub>	B <sub>4</sub>	B <sub>4</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>4</sub>	B <sub>4</sub>
Analys. No.	RR8528	RR8529	RR8530	RR8531	RR8532	RR8533	RR8534	RR8535
Sample No.	375 øfs	375 øfs	375 øfs	375 øf	375 øf	388 vf	388 vf	388 vf
	1	17	21	56	41.a	s.str.7	s.str.12	s.str.14
Locality No.								

Coord.	X	950420	95044	95020.5	94987	94923	951815	95174	951465
	Y	31397	31398	31414	31445	31441	31381	31383	313890
	Z	367	368	371	373	378	388	391	389.5

%								
SiO <sub>2</sub>	46.28	50.21	45.98	47.02	42.77	43.04	45.49	43.21
TiO <sub>2</sub>	0.82	1.15	0.87	0.82	1.02	1.97	0.76	0.81
Al <sub>2</sub> O <sub>3</sub>	18.99	13.50	18.10	19.50	21.92	15.55	15.27	16.80
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	9.57	11.05	9.78	8.79	13.38	14.16	11.18	13.34
MnO	0.11	0.12	0.11	0.12	0.10	0.09	0.15	0.20
MgO	11.01	9.36	11.66	10.40	10.45	10.43	13.62	15.22
CaO	2.29	7.92	2.19	1.31	1.94	3.60	4.28	4.11
Na <sub>2</sub> O	3.89	4.10	4.19	4.49	0.65	3.31	2.22	0.73
K <sub>2</sub> O	0.93	0.03	0.20	0.88	5.29	0.88	0.92	2.00
P <sub>2</sub> O <sub>5</sub>	0.11	0.10	0.08	0.10	0.10	0.29	0.07	0.07
L.O.I.	3.84	0.85	3.14	3.86	9.15	3.12	3.41	5.73
Σ	97.84	98.39	96.30	97.29	106.77	96.44	97.37	102.22

CO <sub>2</sub>								
H <sub>2</sub> O <sup>+</sup>								
H <sub>2</sub> O <sup>-</sup>								
S	0.03	1.05	0.06	0.47	4.13	0.47	0.15	1.67

## Rock type

Analys. No.	RR8528	RR8529	RR8530	RR8531	RR8532	RR8533	RR8534	RR8535
Sample No.	375 øfs	375 øfs	375 øf synk	375 øf synk	375 øf	388 vf	388 vf	388 vf
Locality No.	1	17	21	56	41.a	s.str.7	s.str.12	s.str.14

ppm Cu	160	260	50	100	170	220	100	80
Zn	410	230	1230	580	950	600	1510	3860
Pb	120	20	40	80	130	40	10	80
Ag								
Ba	110	30	40	70	270	70	150	200
V	220	270	230	180	270	370	180	210
Cr	330	220	370	330	380	170	280	300
Co	40	40	30	30	40	50	30	30
Ni	90	70	80	80	140	60	120	110
Sn	10	10	10	10	10	10	0	10
Mo	0	0	0	0	0	0	0	0
W	0	0	0	0	10	0	0	0
Bi	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0
As	0	0	0	0	150	0	0	0
Cl	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0
U	0	0	10	0	10	10	0	0
Rb	10	0	0	10	30	20	10	20
Sr	30	160	30	40	10	30	20	20
Y	10	20	20	10	20	40	10	10
Zr	60	100	60	60	80	180	60	70
Nb	0	0	0	0	0	0	0	0
La	0	0	0	0	0	0	0	0
Ce	0	0	0	0	10	0	0	0
Ta	0	0	0	0	0	0	0	0
Cs	20	30	10	20	20	20	20	10

Rock type	B <sub>1-b</sub> (?)	B <sub>3</sub>	B <sub>4</sub>	B <sub>1</sub>	B <sub>4</sub>	B <sub>5</sub>	C <sub>1-b</sub> (?)	B <sub>3</sub>
Analys. No.	RR8536	RR8537	RR8538	RR8539	RR8540	RR8542	RR8543	RR8544
Sample No.	388 vf	388 vf	JD-15/84	JD-16.a/84	JD-27.a/84	JD-30.a/84	362 vf	375 øfs
	s.str.15	s.str.16					16	22

Locality No.

Coord.	X	951530	951430	763760	763735	763700	763675	94883	950170
	Y	31374	31353.5	31735	31730	31748	31755	31437	31419
	Z	390	390.5	open pit	open pit	open pit	open pit	363	370

%								
SiO <sub>2</sub>	44.51	42.12	54.10	48.81	51.07	54.28	43.30	50.79
TiO <sub>2</sub>	1.09	0.98	1.08	1.16	0.97	1.69	1.10	1.18
Al <sub>2</sub> O <sub>3</sub>	14.60	16.11	16.12	15.47	17.33	16.01	15.51	10.18
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	10.41	9.75	12.18	9.65	12.38	6.79	12.10	13.54
MnO	0.15	0.15	0.12	0.19	0.10	0.04	0.14	0.07
MgO	8.85	10.95	8.30	8.96	5.50	0.17	8.91	5.50
CaO	9.28	11.04	1.18	8.38	3.00	6.43	9.62	7.68
Na <sub>2</sub> O	3.26	1.37	1.68	2.84	3.29	8.11	1.87	4.28
K <sub>2</sub> O	0.93	1.50	2.57	1.21	2.46	0.55	1.09	0.07
P <sub>2</sub> O <sub>5</sub>	0.13	0.11	0.12	0.13	0.12	0.82	0.16	0.16
L.O.I.	2.72	2.14	7.43	2.64	6.36	7.33	2.28	1.06
Σ	95.93	96.22	104.88	99.44	102.58	102.22	96.08	94.51

CO <sub>2</sub>								
H <sub>2</sub> O <sup>+</sup>								
H <sub>2</sub> O <sup>-</sup>								
S	1.01	0.04	4.35	1.14	4.99	4.43	1.56	3.02

## Rock type

Analys. No.	RR8536	RR8537	RR8538	RR8539	RR8540	RR8542	RR8543	RR8544
Sample No.	388 vf	388 vf	JD-15/84	JD-16.a/84	JD-27.a/84	JD-30.a/84	362 vf	375 øfs
	s.str.15	s.str.16					16	22

## Locality No.

ppm Cu	90	100	180	80	350	110	240	10900
Zn	90	80	2060	150	480	1450	250	710
Pb	10	10	20	70	20	30	50	10
Ag								
Ba	110	160	80	40	110	20	90	10
V	280	210	290	300	240	120	260	240
Cr	210	510	200	220	290	10	290	100
Co	40	40	30	40	40	20	40	30
Ni	60	230	50	60	60	0	100	10
Sn	10	10	10	0	10	0	20	20
Mo	0	0	0	0	0	10	0	0
W	0	0	0	0	0	0	0	0
Bi	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0
As	0	0	60	410	60	110	0	0
Cl	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0
U	0	0	10	0	0	0	0	0
Rb	10	20	10	10	10	0	10	0
Sr	120	130	10	160	50	70	100	60
Y	20	10	20	20	10	60	20	20
Zr	90	90	80	90	70	440	100	110
Nb	0	0	0	0	0	10	0	0
La	0	0	0	0	0	0	0	0
Ce	0	0	0	10	0	50	0	10
Ta	0	0	0	0	0	0	0	0
Cs	10	30	20	20	40	0	0	10

Rock type	B <sub>6-f</sub>	B <sub>6-d</sub>	B <sub>6-a</sub>	B <sub>6-d</sub>	B <sub>6-e</sub>	B <sub>6-d</sub>	B <sub>6-b</sub>	B <sub>6-a</sub>
Analys. No.	RR8545	RR8546	RR8547	RR8548	RR8549	RR8550	RR8551	RR8552
Sample No.	JD-32.b/84	375 øfs	388 vf	388 vf				
		2	10	11	13.b	23	s.str.8	s.str.9
Locality No.								

Coord.	X	763665	95042	95040	95044	95045	95017	95181.5	95181
	Y	31755	31397	31405	31402	31401.5	31419	31381	31381
	Z	open pit	368	368	368	369.5	369.5	388.5	389

%									
SiO <sub>2</sub>		37.50	29.17	69.60	46.26	32.32	28.62	35.62	65.45
TiO <sub>2</sub>		1.19	2.00	1.03	1.38	2.12	2.02	1.72	1.06
Al <sub>2</sub> O <sub>3</sub>		17.75	16.92	8.57	12.53	19.46	17.47	16.92	8.85
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>		14.76	31.00	10.37	21.49	19.79	30.36	24.32	12.86
MnO		0.13	0.14	0.04	0.13	0.14	0.14	0.12	0.07
MgO		17.01	9.85	3.50	9.60	15.27	13.20	10.67	4.37
CaO		2.98	3.50	1.32	2.69	2.22	2.12	1.64	0.82
Na <sub>2</sub> O		0.67	1.65	2.42	1.14	0.52	1.09	2.09	1.86
K <sub>2</sub> O		0.27	0.01	0.17	0.01	1.41	0.01	2.10	3.02
P <sub>2</sub> O <sub>5</sub>		0.15	0.05	0.08	0.22	0.25	0.22	0.20	0.01
L.O.I.		6.05	5.64	2.50	5.04	8.54	6.84	4.37	1.60
Σ		98.46	99.93	99.60	100.49	102.04	102.09	99.77	99.97

CO <sub>2</sub>									
H <sub>2</sub> O <sup>+</sup>									
H <sub>2</sub> O <sup>-</sup>									
S		0.10	4.46	1.47	3.33	1.91	4.09	2.35	2.28

## Rock type

Analys. No.	RR8545	RR8546	RR8547	RR8548	RR8549	RR8550	RR8551	RR8552
Sample No.	JD-32.b/84	375 øfs	388 vf	388 vf				
Locality No.		2	10	11	13.b	23	s.str.8	s.str.9

ppm Cu	140	3260	3380	7640	360	4570	1090	2990
Zn	600	120	120	640	970	300	300	120
Pb	10	10	10	10	10	0	0	0
Ag								
Ba	30	20	30	20	180	20	150	170
V	270	440	210	350	540	480	460	230
Cr	340	200	80	110	230	190	150	90
Co	30	100	30	50	30	70	50	50
Ni	140	20	10	10	50	10	40	10
Sn	10	20	10	20	10	0	20	10
Mo	0	0	10	0	0	0	10	0
W	0	0	0	0	0	0	0	0
Bi	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0
As	300	0	0	0	20	0	0	0
Cl	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0
Rb	0	0	0	0	10	0	30	50
Sr	40	160	10	30	10	20	20	20
Y	20	10	10	20	40	20	20	10
Zr	110	180	90	120	190	180	150	110
Nb	0	0	0	0	0	0	0	0
La	0	0	0	0	0	0	0	0
Ce	0	20	0	0	0	10	0	0
Ta	0	0	0	0	0	0	0	10
Cs	20	30	0	20	30	20	60	40

• Blind samples (control)

Rock type

Analys. No.	GI8659	RR8507	RR8517	GI8676	RR8527	RR8541
Sample No.	JO-1/84	8659-a	8659-b	JO-18/84	8676-a	8676-b
Locality No.	Solberg I			382 vf.s.st. 12		

Coord. X  
Y  
Z

%

SiO <sub>2</sub>	45.68	44.86	45.34	41.44	41.14	41.83
TiO <sub>2</sub>	2.06	1.72	1.74	2.26	1.79	1.77
Al <sub>2</sub> O <sub>3</sub>	14.77	15.27	15.37	14.41	16.00	15.90
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	11.32	11.88	12.13	15.03	14.99	15.02
MnO	0.15	0.16	0.17	0.11	0.11	0.11
MgO	10.10	10.05	10.09	13.07	13.43	12.97
CaO	6.71	6.48	6.59	4.60	4.40	4.37
Na <sub>2</sub> O	2.99	2.96	3.02	3.19	2.26	2.57
K <sub>2</sub> O	0.61	0.65	0.65	0.47	0.48	0.47
P <sub>2</sub> O <sub>5</sub>	0.31	0.39	0.40	0.30	0.39	0.41
L.O.I.	3.82	2.99	2.21	4.66	4.72	5.53

Σ	98.52	97.41	97.71	99.54	99.71	100.95
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CO <sub>2</sub>	0.52			0.04		
H <sub>2</sub> O <sup>+</sup>	3.38			4.33		
H <sub>2</sub> O <sup>-</sup>	0.05			0.03		
S	0.10	0.01	0.01	8.84	1.10	1.04

Rock type

Analys. No.	GI8659	RR8507	RR8517	GI8676	RR8527	RR8541
Sample No.	JO-1/84	8659-a	8659-b	JO-18/84	8676-a	8676-b
Locality No.	Solberg I			382 vf. s.str. 12		

ppm Cu	28	30	40	365	360	340
Zn	76	90	90	439	490	500
Pb	12	10	20	10	10	10
Ag	<1			<1		
Ba	240	90	90	220	70	80
V	378	320	320	399	340	340
Cr	438	400	410	100	90	90
Co	74	40	40	88	40	40
Ni	171	150	160	78	30	30
Sn		20	10		20	20
Mo		0	0		0	0
W		0	0		0	0
Bi		0	0		0	0
Sb		0	0		0	0
As		0	0		0	0
Cl		0	0		0	0

Th		0	0		0	0
U		0	0		0	0

Rb	<5	10	10	<5	10	10
Sr	150	140	140	31	30	30
Y	25	10	10	70	40	40
Zr	120	170	180	235	300	290
Nb	<30	20	20	<30	10	0
La		0	0		0	0
Ce		30	30		20	20
Ta		0	0		0	-0
Cs		10	0		20	20

cd 1.8

3.8

TABLE B-4: JOMA - DDH. D39 WHOLE ROCK SILICATE ANALYSES AND MINERAL CONTENTS - 1985 SERIES.

Host-Rock Type Lithologies (24 samples). Rautaruukki Oy, Finland Analyses - (20 elements XRF + L.O.I. + specific gravity).

Plus semi-quantitative mineral contents (combined XRD and thin section study - Geol. Inst., NTH).

TABLE B-4: JOMA - DDH. D39 WHOLE ROCK SILICATE ANALYSES AND MINERAL CONTENTS - 1985 SERIES.

Host-Rock Type Lithologies (24 samples). Rautaruukki Oy, Finland  
 Analyses - (20 elements XRF + L.O.I. + specific gravity).  
 Plus semi-quantitative mineral contents (combined XRD and thin section study - Geol. Inst., NTH).

Rock type	C <sub>2</sub>	C <sub>2</sub>	C <sub>2</sub>	C <sub>1</sub>	C <sub>1</sub>	C <sub>1</sub>	B <sub>1</sub>	A
Analys. No.	RR402							
Sample No.	D39-1	D39-2	D39-3	D39-4	D39-5	D39-6	D39-7	D39-8
meters	15-20m	23.8-30m	30-40m	40-45m	45-50m	50-60m	65-70m	70-80m
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.49	46.24	45.98	46.58	46.76	45.41	46.95	44.97
TiO <sub>2</sub>	0.90	1.21	1.12	1.18	1.02	1.16	1.93	1.99
Al <sub>2</sub> O <sub>3</sub>	17.07	16.05	16.14	16.02	16.45	15.17	15.43	15.09
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	9.33	10.39	9.64	11.05	9.40	9.51	13.02	13.85
MnO	0.14	0.14	0.14	0.16	0.13	0.14	0.16	0.17
MgO	7.65	7.14	6.86	8.09	7.84	5.82	6.02	6.87
CaO	12.25	11.89	13.32	11.98	11.07	14.23	10.85	10.32
Na <sub>2</sub> O	2.06	2.92	2.85	2.30	2.36	2.79	3.68	2.53
K <sub>2</sub> O	1.27	0.21	0.31	0.10	0.80	0.51	0.10	0.65
P <sub>2</sub> O <sub>5</sub>	0.06	0.10	0.10	0.10	0.09	0.10	0.20	0.18
L.O.I.	3.40	3.52	4.18	2.34	2.52	4.78	2.68	2.63
Σ	100.62	99.81	100.64	99.90	98.44	99.62	101.02	99.25
CO <sub>2</sub>								
H <sub>2</sub> O <sup>+</sup>								
H <sub>2</sub> O <sup>-</sup>								
S	0.15	0.17	0.07	0.14	0.14	0.23	0.64	0.29
Sp.gr.	3.01	3.04	2.95	3.03	2.92	2.92	2.91	2.95



Rock type	A <sub>ferro</sub>	B <sub>1</sub> hydr.	B <sub>6f</sub>	A <sub>hydr.</sub>				
Analys. No.	RR402							
Sample No.	D39-9	D39-10	D39-11	D39-12	D39-13	D39-14	D39-15B	D39-15
meters	80-90m	90-100m	100-110m	110-121m	121-130m	130-140m	160,70m	140-151m

Coord. X  
Y  
Z

%								
SiO <sub>2</sub>	46.41	47.20	47.91	46.41	45.92	45.71	37.73	45.47
TiO <sub>2</sub>	2.27	2.29	2.04	1.72	1.72	1.66	1.50	1.60
Al <sub>2</sub> O <sub>3</sub>	14.18	13.99	13.91	14.42	14.80	13.94	13.42	15.44
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	14.50	14.74	13.55	12.48	13.50	12.33	14.87	12.16
MnO	0.19	0.20	0.19	0.19	0.18	0.17	0.17	0.17
MgO	6.16	6.11	6.21	6.59	7.61	7.23	19.23	7.92
CaO	9.99	9.37	10.57	11.95	10.98	10.95	5.70	10.55
Na <sub>2</sub> O	3.62	3.59	3.59	2.89	2.78	3.02	0.03	3.43
K <sub>2</sub> O	0.07	0.11	0.09	0.06	0.25	0.06	0.43	0.19
P <sub>2</sub> O <sub>5</sub>	0.25	0.23	0.21	0.17	0.17	0.16	0.16	0.16
L.O.I.	2.96	1.99	2.24	2.69	2.84	2.94	6.65	4.20

Σ	100.60	99.82	100.51	99.57	100.75	98.17	99.89	101.29
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CO <sub>2</sub>								
H <sub>2</sub> O <sup>+</sup>								
H <sub>2</sub> O <sup>-</sup>								
S	0.34	0.30	0.26	0.21	0.98	0.73	0.00	0.61
Sp. gr.	2.86	2.91	2.85	2.93	2.95	2.95	2.88	2.83



Rock type	A <sub>ferro</sub>	A <sub>ferro</sub>	A <sub>ferro</sub>	B <sub>1</sub>	A	A <sub>alt.</sub> =B <sub>2</sub>	B <sub>4</sub>	C <sub>1</sub>
Analys. No.								
Sample No.	D39-16	D39-17	D39-18	D39-19	D39-20	D39-21	D39-22	D39-23
meters	161-173m	175-181m	181-190m	190-200m	200-210m	210-217.5	219-230m	250-260m

Coord. X  
Y  
Z

%								
SiO <sub>2</sub>	47.23	46.99	47.92	45.85	46.87	45.51	46.74	47.24
TiO <sub>2</sub>	1.98	1.80	1.97	1.91	1.88	2.61	1.57	1.20
Al <sub>2</sub> O <sub>3</sub>	15.77	14.84	15.45	15.54	16.21	15.03	16.39	16.43
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	13.05	12.72	12.75	12.53	12.03	14.87	13.15	10.35
MnO	0.17	0.18	0.18	0.17	0.15	0.15	0.17	0.14
MgO	6.34	7.01	6.04	5.90	6.20	7.84	9.63	8.23
CaO	9.95	10.21	9.73	10.77	10.11	5.36	4.31	9.54
Na <sub>2</sub> O	3.70	2.86	3.89	3.02	3.50	3.96	3.84	3.02
K <sub>2</sub> O	0.05	0.27	0.06	0.08	0.03	0.02	0.74	0.23
P <sub>2</sub> O <sub>5</sub>	0.23	0.22	0.24	0.23	0.23	0.29	0.14	0.11
L.O.I.	2.54	2.04	2.34	2.11	2.24	3.52	4.50	2.67

Σ	101.01	99.14	100.57	98.11	99.45	99.16	101.18	99.16
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CO<sub>2</sub>  
H<sub>2</sub>O<sup>+</sup>  
H<sub>2</sub>O<sup>-</sup>

S	0.52	0.24	0.44	0.50	0.52	1.76	1.89	0.23
Sp. gr.	2.98	2.98	2.85	2.98	2.98	2.94	2.82	2.92

Rock type

Analys. No.

Sample No.	D39-16	D39-17	D39-18	D39-19	D39-20	D39-21	D39-22	D39-23
meters	161-173m	175-181m	181-190m	190-200m	200-210m	210-217.5	219-230m	250-260m

ppm Cu	90	70	80	90	80	80	290	80
Zn	100	90	100	100	90	130	350	60
Pb								
Ag								
Ba	10	50	30	10	20	20	60	30
V	360	320	330	330	320	450	310	230
Cr	240	220	210	220	240	90	310	380
Co								
Ni	100	120	90	100	100	80	140	180
Sn								
Mo								
W								
Bi								
Sb								
As								
Cl								

Th

U

Rb

Sr	240	240	150	150	210	130	70	140
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Y

Zr	200	200	220	210	210	230	130	110
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Nb

La

Ce

Ta

Cs

Semi-quantitative mineral contents from combined thin sections and XRD.

TS=thin section study.

No.:

Analyses	TS					TS		TS
Sample	D39-1	D39-2	D39-3	D39-4	D39-5	D39-6	D39-7	D39-8
Meters	15-20	23.8-30	30-40	40-45	45-50	50-60	65-70	70-80

%								
act	18	16	14	18	17	12	13	23
Chl	22	30	23	27	25	13	28	34
Ab	18	20	26	28	26	27	25	20
qtz	0	1	0	0	0	1	0	0
W.mica	5	1	<1	<1	4	1	<1	2
Bio.	0	0	0	0	0	0	0	0
Stilp.	0	0	0	0	0	0	0	0
Cc.	7	4	14	2	3	25	6	4
Dol.	0	0	0	0	0	0	0	0
Ank.	0	0	0	0	0	0	0	0
Ep.	28	25	19	22	24	15	22	12
Sp	2	3	3	3	3	3	5	5
po	tr	tr	tr	tr	tr	<1	2	<1
cp	0	0	0	0	0	0	0	0
py	0	0	0	0	0	0	0	0
sl	0	0	0	0	0	0	0	0
mt.	0	0	0	0	0	0	0	0

NB! ep = epidote + clinozoicite

sp = sphene + leucoxene

Blank space = not determined

No.:

---

Analyses	TS			TS	No XRD		TS	TS
Local	D39-9	D39-10	D39-11	D39-12	D39-13	D39-14	D39-15.B	D39-15
meters	80-90	90-100	100-110	110-121	121-130	130-140	160.70	140-151

---

%

act	17	18	23	19		18	5	15
Chl	31	34	31	29		28	89	42
Ab	30	23	16	22		27	0	23
qtz	0	0	0	0		<1	0	tr
W.mica	0	0	0	0		0	2	1
Bio.	0	0	0	0		0	0	0
Stilp.	0	0	0	0		0	0	0
Cc.	5	1	3	11		7	0	8
Dol.	0	0	0	0		0	0	0
Ank.	0	0	0	0		0	0	0
Ep.	11	21	22	14		14	0	7
sp.	6	6	5	4		4	4	4
Po	<1	<1	<1	tr		2	0	1
cp	0	0	0	0		0	0	0
py	0	0	0	0		0	0	0
sl	0	0	0	0		0	0	0
mt.	0	0	0	0		0	0	0

Blank = not analysed



TABLE B-5: JOMA WHOLE-ROCK SILICATE ANALYSES - 1986 SERIES.

Mine Host-Rock Type Lithologies and Distal Greenstones (28 samples). Rautaruukki Oy,  
Finland Analyses - (19 elements XRF + L.O.I.).

Plus: semi-quantitative mineral contents (combined XRD and thin section study - Geol.  
Inst., NTH).

TABLE B-5:

JOMA WHOLE-ROCK SILICATE ANALYSES - 1986 SERIES.

Mine Host-Rock Type Lithologies and Distal Greenstones (28 samples).

Rautaruukki Oy, Finland Analyses - (19 elements XRF + L.O.I.).

Plus: semi-quantitative mineral contents (combined XRD and thin section study - Geol. Inst., NTH).

Rock type	C <sub>1</sub>	B <sub>6-d</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>4</sub>	B <sub>6-e</sub>	B <sub>2</sub>	B <sub>3</sub>
Analys. No.	RR							
Sample No.								
Locality No.	4800H-1	4800H-3	4800H-7	4800H-8	4800H-9	4800H-12	4800H-13	3870F2B
Coord. X	95337	95252	94903	94902	94848	94733	94728	95000
Y	31625	31604	31675	31706	31754	31748	31744	31482
Z	480	482	489	489	489	491	492	390
<hr/>								
%								
SiO <sub>2</sub>	44.52	47.14	45.41	48.42	43.51	32.82	51.25	43.36
TiO <sub>2</sub>	1.05	1.11	1.74	1.32	1.17	1.00	1.88	2.06
Al <sub>2</sub> O <sub>3</sub>	15.67	14.47	14.69	14.92	20.55	18.32	14.78	14.75
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	9.24	20.94	12.48	9.48	8.66	23.87	10.51	14.17
MnO	0.14	0.18	0.20	0.10	0.14	0.17	0.12	0.14
MgO	6.68	7.59	7.91	7.35	10.87	12.11	5.65	7.73
CaO	11.88	1.06	9.82	8.78	2.33	0.89	5.45	7.07
Na <sub>2</sub> O	3.45	1.87	2.86	3.85	3.18	1.86	6.10	4.40
K <sub>2</sub> O	0.17	0.07	0.04	0.46	1.91	0.03	0.05	0.03
P <sub>2</sub> O <sub>5</sub>	0.09	0.08	0.16	0.10	0.09	0.08	0.19	0.20
L.O.I.	5.75	5.35	2.78	3.10	6.23	6.86	2.69	4.26
<hr/>								
Σ	98.64	99.86	98.09	97.88	98.64	98.01	98.67	98.17
<hr/>								
CO <sub>2</sub>								
H <sub>2</sub> O <sup>+</sup>								
H <sub>2</sub> O <sup>-</sup>								
S	0.10	0.51	0.20	1.13	1.12	0.01	0.58	1.72



Rock type	B <sub>4</sub>	C <sub>1-b</sub>	C <sub>1-b</sub>	B <sub>4</sub>	B <sub>4</sub>	B <sub>3</sub>	B <sub>4</sub>	B <sub>6-d</sub>
Analys. No.	RR							
Sample No.								
Locality No.	402ØL-2	402ØL-4	402ØL-5	402ØL-6	387ØF-1	387ØF-2	560-1	560-2
Coord. X	94883	94900	94998	94930	95008	95000	95308	95298
Y	31566	31614	31530	31565	31474	31482	31696	31710
Z	404	405.5	404.5	405	390.5	390	562.5	562.5
<b>%</b>								
SiO <sub>2</sub>	49.67	45.55	45.09	43.88	42.59	43.53	47.39	35.80
TiO <sub>2</sub>	1.05	1.10	1.23	1.18	1.14	2.10	1.31	1.18
Al <sub>2</sub> O <sub>3</sub>	17.89	17.13	16.22	18.82	15.84	15.60	16.18	16.62
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	11.61	9.95	10.20	9.70	13.93	14.66	11.56	26.07
MnO	0.09	0.14	0.15	0.09	0.23	0.15	0.35	0.23
MgO	5.17	6.96	6.74	6.35	12.62	9.19	8.40	8.84
CaO	1.64	10.46	11.46	6.66	3.34	5.23	2.76	0.99
Na <sub>2</sub> O	4.66	3.45	3.31	4.12	2.48	3.93	2.83	2.22
K <sub>2</sub> O	2.13	0.09	0.02	1.72	0.93	0.02	1.49	0.02
P <sub>2</sub> O <sub>5</sub>	0.09	0.10	0.10	0.09	0.10	0.22	0.11	0.11
L.O.I.	6.40	3.53	4.03	5.85	6.08	4.59	6.53	7.13
Σ	100.40	98.46	98.55	98.46	99.28	99.22	98.91	99.21
CO <sub>2</sub>								
H <sub>2</sub> O <sup>+</sup>								
H <sub>2</sub> O <sup>-</sup>								
S	5.38	0.65	0.15	1.50	1.61	1.08	2.54	2.23



Rock type	B <sub>6-c</sub>	C <sub>1</sub>	B <sub>4</sub>	B <sub>4</sub>	B <sub>i-b</sub> (B <sub>5</sub> ?)	B <sub>4</sub>
Analys. No.	RR					
Sample No.						
Locality No.	560-3	560-4	560-5	560-6	560-7	560-9
Coord. X	95291	95330	95402	95405	95394	95413
Y	31717	31681	31594	31561	31544	31565
Z	563	562	561	561	558	561

%						
SiO <sub>2</sub>	27.82	47.12	42.24	44.02	46.00	49.42
TiO <sub>2</sub>	1.16	1.04	1.98	1.97	1.64	2.07
Al <sub>2</sub> O <sub>3</sub>	16.96	15.38	17.46	16.85	17.44	16.81
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	33.60	8.55	15.98	13.00	8.87	12.44
MnO	0.19	0.10	0.22	0.14	0.12	0.19
MgO	9.71	8.66	7.78	7.02	3.38	7.25
CaO	1.12	9.89	1.67	5.71	10.36	1.78
Na <sub>2</sub> O	0.46	1.88	1.68	3.64	5.56	3.21
K <sub>2</sub> O	0.14	1.71	3.09	0.61	0.04	1.91
P <sub>2</sub> O <sub>5</sub>	0.07	0.08	0.16	0.21	0.31	0.19
L.O.I.	7.10	3.10	8.53	6.64	5.37	6.35

Σ	98.33	97.51	100.79	99.81	99.09	101.62
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CO <sub>2</sub>						
H <sub>2</sub> O <sup>+</sup>						
H <sub>2</sub> O <sup>-</sup>						
S	0.70	0.21	6.03	3.34	0.45	3.89

forts.

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Analys. No.	RR					
Sample No.						
Locality No.	560-3	560-4	560-5	560-6	560-7	560-9
ppm Cu	540	90	350	60	60	100
Zn	230	60	2920	380	90	1470
Pb						
Ag						
Ba	40	80	140	50	0	100
V	260	230	370	390	320	380
Cr	350	300	340	260	310	310
Co						
Ni	90	120	140	110	140	110
Sn						
Mo						
W						
Bi						
Sb						
As						
Cl						

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Th						
U						

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Rb						
Sr	10	100	10	90	210	20
Y						
Zr	90	80	150	150	130	150
Nb						
La						
Ce						
Ta						
Cs						

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Rock type	B <sub>6-b</sub> (?)	B <sub>6-b</sub> (?)	D	D	C <sub>2</sub> (?)	C <sub>2</sub> (?)
Analys. No.	RR					
Sample No.	Orklumpen	Orklumpen	Røyrvik	Røyrvik	Røyrvik	Røyrvik
Locality No.	OK-1B	OK-5	RØ85-1	RØ85-2	RØ85-3	RØ85-4

Coord. X  
Y  
Z

%						
SiO <sub>2</sub>	55.03	61.60	46.27	42.58	42.06	43.10
TiO <sub>2</sub>	2.23	0.85	2.04	2.08	2.43	1.17
Al <sub>2</sub> O <sub>3</sub>	16.49	15.85	14.79	14.62	13.58	12.22
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	11.60	8.99	10.62	10.99	12.39	8.84
MnO	0.17	0.72	0.16	0.17	0.20	0.17
MgO	2.73	2.57	7.58	7.03	5.84	5.34
CaO	2.65	0.98	10.02	11.75	10.01	13.48
Na <sub>2</sub> O	5.83	0.58	3.03	3.14	1.60	2.96
K <sub>2</sub> O	0.58	4.37	0.58	0.12	1.44	0.52
P <sub>2</sub> O <sub>5</sub>	0.40	0.14	0.35	0.37	0.35	0.13
L.O.I.	3.02	3.20	3.23	5.00	7.59	10.86

Σ	100.73	99.85	98.67	97.85	97.49	98.79
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CO <sub>2</sub>						
H <sub>2</sub> O <sup>+</sup>						
H <sub>2</sub> O <sup>-</sup>						
S	0.98	0.50	0.12	0.19	1.37	0.77

Analys. No.	RR					
Sample No.	Orklumpen	Orklumpen	Røyrvik	Røyrvik	Røyrvik	Røyrvik
Locality No.	OK-1B	OK-5	RØ85-1	RØ85-2	RØ85-3	RØ85-4
ppm Cu	30	80	20	80	50	50
Zn	120	100	70	80	140	70
Pb						
Ag						
Ba	110	670	150	30	250	70
V	270	130	330	340	400	220
Cr	320	90	370	390	300	440
Co						
Ni	160	60	180	190	130	260
Sn						
Mo						
W						
Bi						
Sb						
As						
Cl						
Th						
U						
Rb						
Sr	150	40	250	350	230	310
Y						
Zr	200	170	180	190	210	100
Nb						
La						
Ce						
Ta						
Cs						

Semi-quantitative mineral contents from combined thin sections and XRD.

TS=thin section.

No.:	D	D	C <sub>2</sub> (?)	C <sub>2</sub> (?)	B <sub>6-b</sub> (?)	B <sub>6-b</sub> (?)
Analyses		TS				
Sample	RØ85-1	RØ85-2	RØ85-3	RØ85-4	OK-1B	OK-5
Local	Røyr- vik	Røyr- vik	Røyr- vik	Røyr- vik	Orklum pen	Orklum- pen

%						
act	20	6	0	0	0	0
Chl	31	37	37	35	31	29
Ab	28	31	7	18	48	16
qtz	0	<1	23	11	11	33
W.mica	5	0	6	2	1	17
Bio.	0	0	0	0	0	0
Stilp.	0	0	0	0	0	0
Cc.	3	12	18	30	0	0
Dol.	0	0	0	0	0	0
Ank.	0	0	0	0	0	0
Ep.	3	6	0	0	0	0
sp	6	6	7	3	6	2
po.	tr	tr	3	2	3	1
cp	0	0	0	0	0	0
py	0	0	0	0	0	0
sl	0	0	0	0	0	0
mt.	0	0	0	0	0	0

+ graphite

+ garnet

No.:	B <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>5</sub>	B <sub>6-d</sub>	C <sub>1</sub>	B <sub>1</sub>
Analyses		TS	TS			TS	TS
Sample	3870F-2B	4800H-7	4800H-8	560-1	560-2	560-4	560-7
Local	Joma						

%							
act	6	23	14	0	0	21	0
Chl	47	35	22	41	76	23	19
Ab	28	16	35	22	13	25	44
qtz	0	0	2	18	2		<1
W.mica	0	0	2	3	0	11	0
Bio.	0	0	0	0	0	0	0
Stilp.	0	0	0	0	0	0	0
Cc.	8	0	3	6	0	3	12
Dol.	0	0	0	0	0	0	0
Ank.	0	0	0	0	0	0	0
Ep.	1	21	16	0	0	13	18
sp.	6	5	4	4	3	3	4
po.	5	<1	3	0	6	<1	0
cp	0	0	0	0	0	0	0
py	0	0	0	5	0	0	2
sl	0	0	0	tr	0	0	0
mt.	0	0	0	0	0	0	0

NB! ep = epidote + clinozoicite

sp = sphene + leucoxene

0 = not determined

TABLE B-6 JOMA WHOLE ROCK SILICATE ANALYSES - 1986 DDH SERIES.

Surface Drill Hole plus Mine Host Rock Type Lithologies and Distal  
Greenstones (355 samples).

Rautaruukki Oy, Finland Analyses - 19 elements XRF Technique + L.O.I.

	1.	2.	3.	4.	5.	6.	7.	8.
Rock T.	G <sub>2</sub> (Aalt=B <sub>2</sub> )	G <sub>1</sub> (Aalt=B <sub>2</sub> )	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>2</sub> ?)	G <sub>3</sub> (C <sub>2</sub> )	G <sub>3</sub> (C <sub>2</sub> )	G <sub>3</sub> (C <sub>2</sub> )	G <sub>3</sub> (C <sub>1</sub> ?)
Sample	D59-1	D59-2	D59-3	D59-4	D59-5	D59-6	D59-7	D59-8
Loc.No.	(28-14m)	(14-26m)	(29-40m)	(40-50m)	(50-60m)	(60-74m)	(75-86m)	(86-94m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	42.590	45.020	45.050	44.350	46.180	45.850	46.840	46.830
TiO <sub>2</sub>	1.970	1.840	1.360	1.220	0.985	1.080	1.040	1.010
Al <sub>2</sub> O <sub>3</sub>	15.890	15.030	15.640	15.280	15.370	16.220	14.520	14.450
Fe <sub>2</sub> O <sub>3</sub>	13.110	11.630	11.320	10.190	9.320	8.730	10.310	10.500
MnO	0.151	0.183	0.146	0.135	0.126	0.108	0.150	0.166
MgO	6.600	5.010	6.880	8.220	8.950	7.130	8.960	8.210
CaO	9.850	11.880	11.090	10.840	10.230	10.500	10.160	11.700
Na <sub>2</sub> O	3.630	3.780	3.040	2.100	1.980	2.310	2.420	2.330
K <sub>2</sub> O	0.021	0.033	0.113	0.962	1.110	1.860	0.644	0.399
P <sub>2</sub> O <sub>5</sub>	0.240	0.239	0.102	0.107	0.065	0.078	0.067	0.065
L.O.I.	4.82	4.34	3.06	3.54	3.26	3.92	3.07	2.93
Sum	94.760	94.930	95.150	93.880	94.690	94.500	95.380	95.850
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.920	0.248	0.432	0.580	0.431	0.859	0.187	0.061
Cu	0.039	0.006	0.016	0.007	0.006	0.009	0.004	0.008
Zn	0.009	0.009	0.007	0.007	0.006	0.007	0.007	0.006
Pb								
Ag								
Ba	0.002	0.002	0.003	0.007	0.005	0.009	0.006	0.004
V	0.034	0.030	0.029	0.025	0.021	0.022	0.022	0.025
Cr	0.022	0.021	0.033	0.034	0.039	0.043	0.036	0.036
Co								
Ni	0.008	0.007	0.012	0.016	0.018	0.022	0.017	0.010
Sr	0.025	0.020	0.016	0.014	0.010	0.013	0.011	0.011
Zr	0.022	0.020	0.011	0.009	0.007	0.008	0.008	0.007

	9.	10.	11.	12.	13.	14.	15.	16.
Rock T.	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>2</sub> )	G <sub>3</sub> (C <sub>1</sub> )					
Sample	D59-9	D59-10	D59-11	D59-12	D59-13	D59-14	D59-15	D59-16
Loc.No.	(95-100.65m)	(102-112.50m)	(112.5-118.2m)	(118.2-130m)	(130-140m)	(140-148m)	(150-160m)	(160-170m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.840	44.980	45.690	45.540	45.600	44.670	44.370	44.250
TiO <sub>2</sub>	0.927	1.000	1.170	1.060	0.969	0.895	1.210	1.150
Al <sub>2</sub> O <sub>3</sub>	15.020	15.740	15.500	15.480	15.840	15.720	15.350	15.620
Fe <sub>2</sub> O <sub>3</sub>	10.340	9.490	10.550	9.710	9.730	9.260	9.240	9.310
MnO	0.150	0.130	0.154	0.140	0.146	0.145	0.135	0.134
MgO	7.340	8.830	7.690	8.670	9.160	9.990	8.150	7.720
CaO	11.530	10.910	11.850	10.560	10.980	11.440	11.360	11.130
Na <sub>2</sub> O	2.550	1.740	2.500	2.350	2.180	1.900	2.590	2.060
K <sub>2</sub> O	0.542	1.060	0.047	0.463	0.303	0.294	0.412	1.400
P <sub>2</sub> O <sub>5</sub>	0.057	0.084	0.098	0.083	0.075	0.067	0.112	0.085
L.O.I.	2.75	4.01	2.73	3.26	3.25	3.56	4.03	4.58
Sum	95.590	94.210	95.540	94.210	95.160	94.560	93.140	93.090
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.211	0.195	0.194	0.050	0.057	0.051	0.117	0.124
Cu	0.012	0.006	0.008	0.004	0.007	0.007	0.006	0.006
Zn	0.007	0.006	0.007	0.006	0.006	0.006	0.006	0.006
Pb								
Ag								
Ba	0.004	0.006	0.003	0.003	0.003	0.004	0.004	0.008
V	0.023	0.020	0.026	0.021	0.020	0.018	0.025	0.024
Cr	0.040	0.031	0.043	0.029	0.032	0.030	0.027	0.028
Co								
Ni	0.014	0.018	0.011	0.016	0.015	0.019	0.016	0.016
Sr	0.012	0.013	0.014	0.012	0.013	0.011	0.013	0.016
Zr	0.006	0.008	0.009	0.008	0.008	0.007	0.009	0.009

NB! - Blank space = not analysed for.

	17.	18.	19.	20.	21.	22.	23.	24.
Rock T.	G <sub>1</sub> (B <sub>2</sub> )	G <sub>1</sub> (B <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> )	G <sub>1</sub> (B <sub>1</sub> -B <sub>2</sub> ?)	G <sub>1</sub> (B <sub>1</sub> )	G <sub>1</sub> (B <sub>1</sub> -A?)	G <sub>1</sub> (A)
Sample	D59-17	D59-18	D59-19	D59-20	D59-21	D59-22	D59-23	D59-24
Loc. No.	(170-180m)	(180-190m)	(190-200m)	(200-210m)	(210-220m)	(220-227m)	(227-235m)	(235-245m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	44.740	45.350	47.080	45.940	46.510	45.750	45.180	43.940
TiO <sub>2</sub>	2.150	1.560	1.080	1.140	1.940	1.800	1.780	1.710
Al <sub>2</sub> O <sub>3</sub>	14.750	15.150	15.020	15.600	14.420	14.370	14.550	14.650
Fe <sub>2</sub> O <sub>3</sub>	12.280	12.070	10.090	9.820	12.440	12.620	13.120	12.880
MnO	0.157	0.167	0.150	0.143	0.164	0.174	0.176	0.186
MgO	6.200	6.880	7.480	8.880	6.360	6.690	7.000	7.110
CaO	9.180	10.300	11.870	10.880	9.120	10.890	9.120	10.740
Na <sub>2</sub> O	4.020	3.400	2.780	2.160	3.610	3.410	2.560	2.250
K <sub>2</sub> O	0.337	0.072	0.172	0.623	0.472	0.094	0.287	0.015
P <sub>2</sub> O <sub>5</sub>	0.250	0.147	0.087	0.085	0.210	0.177	0.170	0.169
L.O.I.	4.55	3.91	2.58	3.39	2.91	3.31	3.69	4.18
Sum	94.370	95.350	96.070	95.500	95.520	96.310	94.850	94.070
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.242	0.167	0.190	0.128	0.218	0.334	1.350	0.489
Cu	0.006	0.003	0.008	0.005	0.005	0.008	0.005	0.005
Zn	0.010	0.008	0.007	0.006	0.009	0.009	0.014	0.010
Pb								
Ag								
Ba	0.004	0.003	0.002	0.005	0.007	0.003	0.006	0.001
V	0.037	0.030	0.024	0.023	0.035	0.034	0.034	0.033
Cr	0.016	0.024	0.033	0.028	0.014	0.015	0.020	0.017
Co								
Ni	0.009	0.009	0.011	0.016	0.008	0.008	0.009	0.008
Sr	0.015	0.018	0.014	0.013	0.018	0.019	0.013	0.016
Zr	0.018	0.014	0.008	0.009	0.016	0.014	0.014	0.014

	25.	26.	27.	28.	29.	30.	31.	32.
Rock T.	G <sub>1</sub> (B <sub>2</sub> )	G <sub>1</sub> (B <sub>4</sub> )	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> )	G <sub>1</sub> (B)	G <sub>1</sub> (B <sub>hybr.</sub> )	G <sub>3</sub> (A <sub>2</sub> C <sub>2</sub> ?)	G <sub>3</sub> (C <sub>2</sub> ?)
Sample	D59-25	D59-26	D10-1	D10-2	D10-3	D10-4	D10-5	D10-6
Loc. No.	(246-260m)	(265-268m)	(8-20m)	(20-30m)	(30-40m)	(40-51.35m)	(51.35-60m)	(60-72.70m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	44.590	44.830	44.550	46.360	46.030	46.340	44.930	44.340
TiO <sub>2</sub>	1.780	1.650	1.100	1.080	1.560	1.480	1.570	1.510
Al <sub>2</sub> O <sub>3</sub>	15.630	15.560	15.430	15.650	14.920	15.140	14.280	15.090
Fe <sub>2</sub> O <sub>3</sub>	11.510	11.090	9.590	9.490	10.990	10.530	10.970	10.890
MnO	0.145	0.145	0.138	0.138	0.158	0.150	0.166	0.165
MgO	6.700	7.500	7.120	6.070	5.770	6.360	6.920	7.850
CaO	9.130	7.210	12.770	12.630	12.150	10.750	11.480	10.900
Na <sub>2</sub> O	3.700	3.870	2.390	3.110	3.180	3.620	3.070	2.350
K <sub>2</sub> O	0.015	0.189	0.634	0.332	0.379	0.404	0.190	0.644
P <sub>2</sub> O <sub>5</sub>	0.203	0.202	0.092	0.085	0.153	0.145	0.167	0.156
L.O.I.	4.70	7.14	4.26	3.40	3.34	3.36	3.83	3.67
Sum	94.140	92.860	94.060	95.180	95.630	95.360	93.990	94.120
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	1.080	0.818	0.132	0.163	0.312	0.538	0.177	0.128
Cu	0.013	0.010	0.006	0.009	0.008	0.007	0.005	0.007
Zn	0.009	0.011	0.007	0.006	0.008	0.009	0.007	0.007
Pb								
Ag								
Ba	0.001	0.004	0.004	0.003	0.005	0.007	0.004	0.008
V	0.031	0.027	0.024	0.024	0.031	0.028	0.027	0.027
Cr	0.023	0.029	0.031	0.032	0.031	0.022	0.020	0.026
Co								
Ni	0.009	0.013	0.013	0.010	0.013	0.011	0.009	0.011
Sr	0.015	0.015	0.017	0.014	0.017	0.015	0.017	0.014
Zr	0.017	0.015	0.009	0.008	0.012	0.012	0.015	0.013

	33.	34.	35.	36.	37.	38.	39.	40.
Rock T.	G <sub>1</sub> (B <sub>hybr.</sub> )	G <sub>1</sub> (B)	G <sub>1</sub> (B <sub>2</sub> ?)	G <sub>1</sub> (B <sub>2</sub> )	G <sub>1</sub> (B <sub>2</sub> ?)	G <sub>1</sub> (B <sub>1</sub> )	G <sub>1</sub> (B <sub>2</sub> ?)	G <sub>1</sub> (B <sub>2</sub> )
Sample	D10-7	D10-8	D10-9	D10-10	D10-11	D10-12	D10-13	D10-14
Loc. No.	(72.7-80m)	(80-90m)	(90-100m)	(100-110m)	(110-120m)	(120-130m)	(130-140m)	(140-150m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.540	45.980	46.300	44.470	45.570	47.790	46.950	45.580
TiO <sub>2</sub>	1.380	1.770	1.510	1.800	1.680	1.400	1.420	1.780
Al <sub>2</sub> O <sub>3</sub>	15.220	14.360	16.290	14.600	15.050	15.260	15.260	16.150
Fe <sub>2</sub> O <sub>3</sub>	10.810	12.410	10.240	11.010	12.130	10.390	11.540	11.700
MnO	0.162	0.175	0.141	0.167	0.163	0.144	0.150	0.143
MgO	5.950	6.420	4.820	5.550	7.120	6.690	7.620	6.870
CaO	10.870	10.100	10.890	10.980	9.490	10.360	8.810	8.970
Na <sub>2</sub> O	3.860	3.250	4.020	4.140	3.580	3.520	3.620	3.730
K <sub>2</sub> O	0.129	0.326	0.237	0.143	0.054	0.111	0.241	0.114
P <sub>2</sub> O <sub>5</sub>	0.130	0.182	0.174	0.232	0.185	0.138	0.148	0.184
L.O.I.	3.44	2.87	3.39	5.01	3.54	2.84	3.25	3.28
Sum	95.350	95.370	94.900	93.400	95.450	96.080	96.130	95.730
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.325	0.467	0.227	0.235	0.448	0.166	0.344	0.594
Cu	0.003	0.003	0.006	0.004	0.014	0.007	0.014	0.014
Zn	0.008	0.010	0.007	0.009	0.008	0.007	0.009	0.009
Pb								
Ag								
Ba	0.002	0.005	0.004	0.003	0.001	0.002	0.006	0.003
V	0.028	0.034	0.028	0.031	0.033	0.030	0.029	0.031
Cr	0.014	0.016	0.028	0.022	0.027	0.035	0.034	0.032
Co								
Ni	0.007	0.008	0.011	0.009	0.008	0.007	0.008	0.009
Sr	0.015	0.015	0.018	0.017	0.019	0.019	0.014	0.020
Zr	0.010	0.015	0.014	0.019	0.015	0.012	0.012	0.015

	41.	42.	43.	44.	45.	46.	47.	48.
Rock T.	G <sub>3</sub> (C <sub>1</sub> -B?)	G <sub>3</sub> (C <sub>2</sub> -B?)	G <sub>1</sub> (B <sub>hybr.</sub> )	G <sub>3</sub> (C <sub>1</sub> ?)	G <sub>3</sub> (C <sub>1</sub> ?)	G <sub>1</sub> (B)	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> hybr.)
Sample	D10-15	D10-16	D10-17	D10-18	D10-19	D10-20	D10-21	D10-22
Loc. No.	(150-160m)	(160-170m)	(170-180m)	(180-190m)	(190-200m)	(200-210m)	(210-220m)	(220-230m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	43.280	44.830	47.950	46.330	41.480	45.350	46.890	46.210
TiO <sub>2</sub>	1.460	1.540	1.360	1.490	1.950	1.860	1.190	1.270
Al <sub>2</sub> O <sub>3</sub>	15.250	14.600	14.730	15.680	15.370	14.690	14.760	15.650
Fe <sub>2</sub> O <sub>3</sub>	11.370	12.090	10.480	10.840	13.310	12.980	9.940	10.850
MnO	0.168	0.170	0.144	0.140	0.187	0.172	0.143	0.154
MgO	7.530	8.540	8.160	7.630	7.290	6.750	9.350	9.210
CaO	12.480	10.230	8.920	9.470	10.950	9.540	9.310	9.360
Na <sub>2</sub> O	2.200	2.740	3.300	3.150	2.370	2.530	2.510	2.660
K <sub>2</sub> O	0.150	0.096	0.376	0.275	0.017	0.031	0.729	0.207
P <sub>2</sub> O <sub>5</sub>	0.144	0.160	0.111	0.109	0.170	0.163	0.096	0.120
L.O.I.	3.89	3.61	2.92	2.99	5.36	4.39	3.68	3.26
Sum	94.470	95.450	95.860	95.370	93.390	94.540	95.280	95.990
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.466	0.520	0.282	0.140	0.234	0.576	0.310	0.191
Cu	0.009	0.009	0.015	0.012	0.004	0.007	0.011	0.006
Zn	0.008	0.008	0.007	0.007	0.011	0.011	0.007	0.008
Pb								
Ag								
Ba	0.004	0.002	0.008	0.009	0.001	0.001	0.014	0.005
V	0.028	0.028	0.025	0.027	0.033	0.035	0.023	0.024
Cr	0.039	0.028	0.027	0.030	0.028	0.017	0.039	0.041
Co								
Ni	0.013	0.013	0.014	0.018	0.011	0.008	0.022	0.021
Sr	0.022	0.016	0.011	0.016	0.018	0.016	0.011	0.015
Zr	0.012	0.013	0.011	0.012	0.016	0.014	0.010	0.011

Rock T.	49. G <sub>3</sub> (C <sub>1</sub> )	50. G <sub>1</sub> (A-B?)	51. G <sub>3</sub> (A <sub>hyb</sub> ?)	52. G <sub>1</sub> (B <sub>hyb</sub> )	53. G <sub>1</sub> (B <sub>1</sub> ?)	54. G <sub>1</sub> (A <sub>alt</sub> -B <sub>2</sub> ?)	55. G <sub>1</sub> (B <sub>1</sub> )	56. G <sub>1</sub> (A)
Sample	D10-23	D64-1	D64-2	D64-3	D64-4	D64-5	D64-6	D64-7
Loc.No.	(230-240m)	(2-10m)	(10-22m)	(40-50m)	(50-60m)	(60-70m)	(70-80m)	(80-90m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.670	46.670	45.900	47.490	45.590	44.720	48.290	46.660
TiO <sub>2</sub>	1.220	1.780	1.420	1.450	1.600	1.840	1.840	1.950
Al <sub>2</sub> O <sub>3</sub>	16.030	14.880	13.860	15.920	15.090	14.190	13.720	14.520
Fe <sub>2</sub> O <sub>3</sub>	10.590	11.690	10.960	10.840	11.690	11.330	12.090	11.850
MnO	0.138	0.180	0.179	0.136	0.158	0.164	0.172	0.159
MgO	9.900	6.760	6.640	6.040	6.570	7.270	6.230	5.640
CaO	8.360	9.720	12.970	9.340	10.980	10.170	10.530	11.250
Na <sub>2</sub> O	2.590	3.550	3.100	3.830	2.970	2.800	3.620	3.710
K <sub>2</sub> O	0.624	0.473	0.054	0.470	0.484	1.200	0.038	0.031
P <sub>2</sub> O <sub>5</sub>	0.102	0.202	0.142	0.123	0.153	0.190	0.186	0.194
L.O.I.	3.55	3.22	3.56	3.72	3.65	4.90	2.27	3.33
Sum	95.530	96.250	95.480	95.980	95.610	94.110	97.060	96.390
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.165	0.299	0.196	0.293	0.297	0.161	0.304	0.472
Cu	0.012	0.004	0.007	0.010	0.007	0.007	0.006	0.006
Zn	0.006	0.009	0.008	0.008	0.008	0.009	0.009	0.010
Pb								
Ag								
Ba	0.011	0.011	0.002	0.003	0.003	0.007	0.001	0.002
V	0.025	0.032	0.030	0.030	0.031	0.034	0.036	0.038
Cr	0.045	0.024	0.020	0.035	0.024	0.017	0.022	0.024
Co								
Ni	0.023	0.009	0.008	0.012	0.011	0.009	0.008	0.008
Sr	0.012	0.016	0.018	0.015	0.017	0.014	0.013	0.015
Zr	0.011	0.016	0.011	0.010	0.012	0.014	0.014	0.015

Rock T.	57. G <sub>1</sub> (B <sub>4</sub> ?)	58. G <sub>1</sub> (B <sub>2</sub> ?)	59. G <sub>3</sub> (C <sub>1</sub> )	60. G <sub>3</sub> (C <sub>1</sub> )	61. G <sub>1</sub> (B)	62. G <sub>3</sub> (C <sub>2</sub> ?)	63. G <sub>3</sub> (C <sub>2</sub> ?)	64. G <sub>3</sub> (C <sub>2</sub> ?)
Sample	D64-8	D64-9	D64-10	D64-11	D64-12	D64-13	D64-14	D64-15
Loc.No.	(90-105m)	(105-114.5m)	(120-130m)	(134-145.6m)	(155-165m)	(165-175m)	(175-190m)	(190-200m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	43.950	44.970	48.060	45.830	45.480	45.610	45.930	45.080
TiO <sub>2</sub>	1.740	1.840	0.992	1.140	1.690	0.944	0.991	1.530
Al <sub>2</sub> O <sub>3</sub>	16.170	16.120	14.320	14.890	14.440	16.000	16.310	15.260
Fe <sub>2</sub> O <sub>3</sub>	12.270	12.280	9.750	9.900	12.050	9.170	9.370	11.390
MnO	0.160	0.162	0.144	0.140	0.175	0.140	0.140	0.168
MgO	5.680	4.470	6.660	8.560	6.190	8.970	7.990	5.990
CaO	9.480	10.570	11.760	10.840	11.000	11.650	11.780	12.570
Na <sub>2</sub> O	2.720	3.800	3.340	2.380	2.950	2.220	2.140	2.990
K <sub>2</sub> O	1.090	0.243	0.353	0.779	0.232	0.422	0.841	0.250
P <sub>2</sub> O <sub>5</sub>	0.168	0.163	0.072	0.097	0.199	0.077	0.073	0.135
L.O.I.	4.13	4.03	3.33	3.77	4.12	3.57	3.32	3.60
Sum	94.090	94.900	95.660	94.940	94.750	95.360	95.760	95.650
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.888	0.188	0.104	0.343	0.315	0.057	0.050	0.185
Cu	0.006	0.008	0.007	0.011	0.005	0.006	0.006	0.008
Zn	0.011	0.009	0.006	0.007	0.009	0.006	0.005	0.007
Pb								
Ag								
Ba	0.006	0.002	0.002	0.006	0.004	0.004	0.007	0.003
V	0.034	0.034	0.024	0.023	0.031	0.021	0.023	0.032
Cr	0.029	0.031	0.033	0.047	0.023	0.029	0.032	0.028
Co								
Ni	0.013	0.013	0.009	0.022	0.011	0.017	0.016	0.011
Sr	0.016	0.016	0.015	0.012	0.015	0.014	0.015	0.018
Zr	0.013	0.013	0.006	0.008	0.015	0.007	0.007	0.011

	65	66	67	68	69	70	71	72
Rock T.	G <sub>1</sub> (B <sub>1</sub> )	G <sub>1</sub> (B <sub>2</sub> ?)	G <sub>1</sub> (A <sub>alt</sub> -B <sub>2</sub> ?)	G <sub>1</sub> (A <sub>alt</sub> )	G <sub>1</sub> (B <sub>2</sub> )	G <sub>1</sub> (B <sub>1</sub> )	G <sub>1</sub> (B <sub>2</sub> ?)	G <sub>1</sub> (B <sub>1</sub> A)
Sample	D64-16	D64-17	D64-18	D64-19	D64-20	D64-21	D64-22	D64-23
Loc.No.	(200-210m)	(210-220m)	(220-230m)	(230-240m)	(240-250m)	(250-260m)	(260-270m)	(270-280m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.040	46.950	46.680	48.090	47.570	47.760	46.290	47.300
TiO <sub>2</sub>	1.630	1.950	2.130	1.720	1.910	1.820	1.700	2.040
Al <sub>2</sub> O <sub>3</sub>	15.310	14.730	14.000	14.460	14.740	14.030	15.040	13.720
Fe <sub>2</sub> O <sub>3</sub>	11.700	11.980	13.580	11.380	11.810	11.930	11.770	13.370
MnO	0.160	0.161	0.186	0.165	0.219	0.196	0.192	0.200
MgO	5.680	6.370	6.510	7.200	7.760	7.020	7.220	6.290
CaO	11.380	9.030	9.580	8.870	8.090	9.730	9.950	10.550
Na <sub>2</sub> O	3.340	4.190	3.740	3.780	3.710	3.370	3.030	3.490
K <sub>2</sub> O	0.217	0.364	0.033	0.553	0.251	0.030	0.211	0.039
P <sub>2</sub> O <sub>5</sub>	0.148	0.198	0.222	0.159	0.183	0.169	0.155	0.204
L.O.I.	3.10	3.40	2.46	2.98	2.98	3.57	3.48	2.49
Sum	95.950	96.390	97.110	97.020	96.850	96.350	95.980	97.510
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.293	0.557	0.527	0.888	0.762	0.232	0.500	0.264
Cu	0.006	0.006	0.006	0.007	0.005	0.005	0.004	0.005
Zn	0.008	0.010	0.011	0.009	0.009	0.009	0.010	0.010
Pb								
Ag								
Ba	0.002	0.005	0.002	0.005	0.003	0.002	0.003	0.002
V	0.032	0.037	0.041	0.036	0.037	0.036	0.035	0.038
Cr	0.027	0.021	0.010	0.017	0.024	0.023	0.025	0.013
Co								
Ni	0.014	0.010	0.006	0.007	0.008	0.008	0.010	0.008
Sr	0.017	0.015	0.019	0.014	0.017	0.013	0.010	0.011
Zr	0.012	0.015	0.017	0.013	0.015	0.014	0.013	0.016

	73	74	75	76	77	78	79	80
Rock T.	G <sub>1</sub> (A+B <sub>2</sub> )	G <sub>4</sub> (B <sub>4</sub> )	G <sub>4</sub> (B <sub>4</sub> )	G <sub>3</sub> B <sub>4</sub> ?	G <sub>3</sub> (B <sub>2</sub> -B <sub>4</sub> ?)	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> )
Sample	D64-24	D64-25	D64-26	D64-27	D64-28	D64-29	D64-30	D64-31
Loc.No.	(280-290m)	(290-298m)	(298.6-310m)	(310-320m)	(320-330m)	(330-340m)	(340-350m)	(350-360m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	47.710	48.160	49.950	46.920	45.780	46.020	47.840	45.660
TiO <sub>2</sub>	2.010	1.250	1.040	1.180	1.160	1.180	1.100	1.220
Al <sub>2</sub> O <sub>3</sub>	13.240	16.140	16.830	17.210	18.170	16.420	15.110	16.420
Fe <sub>2</sub> O <sub>3</sub>	12.690	9.510	9.110	9.110	9.430	8.830	9.220	9.850
MnO	0.183	0.169	0.123	0.127	0.124	0.129	0.137	0.131
MgO	5.620	8.970	9.000	7.260	5.660	8.410	9.040	8.860
CaO	9.880	5.120	3.890	10.280	10.410	9.840	10.250	9.250
Na <sub>2</sub> O	4.410	3.540	2.780	3.150	3.640	2.760	2.870	2.650
K <sub>2</sub> O	0.047	1.860	2.460	0.432	0.251	1.070	0.341	0.753
P <sub>2</sub> O <sub>5</sub>	0.237	0.112	0.089	0.102	0.131	0.102	0.097	0.111
L.O.I.	2.92	4.83	4.59	3.53	3.99	4.36	3.09	3.65
Sum	96.420	95.880	96.370	96.270	95.350	95.120	96.220	95.210
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.434	1.660	1.600	0.576	0.770	0.321	0.106	0.180
Cu	0.007	0.007	0.060	0.008	0.006	0.009	0.008	0.011
Zn	0.010	0.026	0.037	0.008	0.009	0.006	0.006	0.006
Pb								
Ag								
Ba	0.002	0.010	0.015	0.003	0.003	0.007	0.002	0.010
V	0.037	0.027	0.026	0.025	0.025	0.023	0.021	0.024
Cr	0.012	0.025	0.030	0.033	0.032	0.044	0.033	0.035
Co								
Ni	0.006	0.008	0.011	0.016	0.017	0.025	0.020	0.025
Sr	0.014	0.004	0.004	0.016	0.016	0.015	0.018	0.023
Zr	0.016	0.009	0.007	0.009	0.008	0.009	0.009	0.010

Rock T.	81. G <sub>3</sub> (C <sub>1</sub> )	82. G <sub>3</sub> (C <sub>1</sub> )	83. G <sub>3</sub> (C <sub>1</sub> )	84. G <sub>3</sub> (C <sub>1</sub> )	85. G <sub>1</sub> (B <sub>2</sub> -B <sub>1</sub> ?)	86. G <sub>3</sub> (C <sub>1</sub> -B <sub>2</sub> ?)	87. G <sub>3</sub> (C <sub>2</sub> hyb)	88. G <sub>3</sub> (C <sub>2</sub> )
Sample	D64-32	D64-33	D64-34	D64-35	D18-1	D18-2	D18-3	D18-4
Loc.No.	(360-370m)	(370-380m)	(380-390m)	(390-400m)	(0-10m)	(10-20m)	(20-30m)	(30-40m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.220	44.240	45.710	43.160	47.980	45.540	44.140	45.720
TiO <sub>2</sub>	1.170	1.220	1.190	1.290	1.680	1.720	1.230	1.120
Al <sub>2</sub> O <sub>3</sub>	16.120	16.070	15.580	16.920	15.330	14.840	14.250	15.690
Fe <sub>2</sub> O <sub>3</sub>	9.770	10.050	9.800	10.400	10.880	9.720	10.250	9.640
MnO	0.133	0.144	0.140	0.147	0.137	0.150	0.166	0.139
MgO	9.140	9.640	9.510	10.050	6.340	5.650	8.250	8.450
CaO	10.000	10.550	10.110	9.940	9.380	11.600	11.550	10.960
Na <sub>2</sub> O	2.560	2.160	2.150	1.790	3.780	4.190	2.320	2.080
K <sub>2</sub> O	0.442	0.312	0.796	0.525	0.346	0.087	0.779	0.792
P <sub>2</sub> O <sub>5</sub>	0.105	0.105	0.103	0.108	0.175	0.235	0.107	0.091
L.O.I.	3.27	3.81	3.86	4.11	2.66	4.99	4.85	3.46
Sum	96.190	94.750	95.310	94.550	96.430	94.000	93.280	94.860
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.251	0.117	0.067	0.058	0.459	0.190	0.138	0.067
Cu	0.017	0.009	0.008	0.009	0.006	0.005	0.004	0.002
Zn	0.006	0.006	0.006	0.006	0.009	0.009	0.007	0.006
Pb								
Ag								
Ba	0.007	0.006	0.008	0.008	0.001	0.001	0.008	0.006
V	0.022	0.022	0.023	0.024	0.031	0.030	0.026	0.022
Cr	0.034	0.035	0.034	0.037	0.025	0.027	0.032	0.027
Co								
Ni	0.024	0.024	0.023	0.025	0.010	0.010	0.015	0.015
Sr	0.029	0.023	0.018	0.017	0.016	0.014	0.014	0.012
Zr	0.010	0.010	0.010	0.010	0.017	0.016	0.011	0.009

Rock T.	89. G <sub>3</sub> (C <sub>2</sub> )	90. G <sub>3</sub> (C <sub>2</sub> )	91. G <sub>3</sub> (C <sub>1</sub> -B <sub>1</sub> hyb)	92. G <sub>3</sub> (C <sub>2</sub> )	93. G <sub>3</sub> (C <sub>2</sub> )	94. G <sub>3</sub> (C <sub>1</sub> ?)	95. G <sub>3</sub> (C <sub>1</sub> -B <sub>1</sub> ?)	96. G <sub>3</sub> (C <sub>2</sub> alt.)
Sample	D18-5	D18-6	D18-7	D18-8	D18-9	D18-10	D18-11	D18-12
Loc.No.	(40-50m)	(50-60m)	(60-73m)	(73-80m)	(80-90m)	(90-102m)	(102-110m)	(110-120m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	47.590	46.220	46.610	44.870	45.630	43.490	44.070	44.110
TiO <sub>2</sub>	1.090	0.996	1.280	0.653	0.944	0.921	1.520	1.260
Al <sub>2</sub> O <sub>3</sub>	16.080	16.250	14.670	15.550	15.720	15.550	15.010	15.860
Fe <sub>2</sub> O <sub>3</sub>	9.100	8.970	10.380	8.670	9.440	8.780	10.840	9.780
MnO	0.124	0.128	0.149	0.129	0.137	0.140	0.151	0.136
MgO	7.490	7.920	6.350	10.070	7.890	8.060	6.090	6.250
CaO	9.150	10.990	11.910	10.100	11.630	13.400	12.560	12.070
Na <sub>2</sub> O	3.050	2.230	3.330	1.830	2.610	2.020	2.920	2.600
K <sub>2</sub> O	0.947	1.140	0.155	1.120	0.279	0.404	0.342	1.060
P <sub>2</sub> O <sub>5</sub>	0.084	0.072	0.109	0.031	0.068	0.071	0.144	0.099
L.O.I.	3.10	3.52	3.47	4.40	3.54	4.69	4.26	4.72
Sum	94.890	95.110	95.210	93.240	94.610	93.030	93.910	93.430
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.091	0.076	0.210	0.095	0.150	0.073	0.165	0.076
Cu	0.007	0.007	0.009	0.004	0.008	0.007	0.007	0.004
Zn	0.006	0.005	0.007	0.005	0.006	0.005	0.008	0.006
Pb								
Ag								
Ba	0.006	0.008	0.002	0.008	0.004	0.005	0.005	0.007
V	0.022	0.021	0.027	0.018	0.024	0.020	0.031	0.027
Cr	0.021	0.020	0.025	0.039	0.036	0.028	0.029	0.029
Co								
Ni	0.015	0.015	0.010	0.022	0.013	0.016	0.012	0.015
Sr	0.011	0.016	0.018	0.008	0.012	0.015	0.022	0.020
Zr	0.008	0.008	0.010	0.003	0.007	0.007	0.011	0.009

Rock T.	97 G <sub>3</sub> (C <sub>2</sub> )	98 G <sub>1</sub> (B <sub>2</sub> hydr?)	99 G <sub>2</sub> (A ferro)	100 G <sub>2</sub> (A ferro)	101 G <sub>1</sub> (A ferro)	102 G <sub>2</sub> (A ferro)	103 G <sub>1</sub> (B <sub>1</sub> -B <sub>2</sub> ?)	104 G <sub>1</sub> (A <sub>alt</sub> -B <sub>2</sub> )
Sample	D18-13	D18-14	D18-15	D18-16	D18-17	D18-18	D18-19	D18-20
Loc. No.	(120-130m)	(130-140m)	(140-150m)	(150-160m)	(160-170m)	(170-180m)	(180-190m)	(190-200m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.990	46.180	45.000	44.290	46.260	46.020	45.350	46.820
TiO <sub>2</sub>	0.975	1.580	2.310	2.480	2.270	2.180	1.670	1.690
Al <sub>2</sub> O <sub>3</sub>	15.380	15.220	13.830	12.880	13.030	14.030	13.760	13.830
Fe <sub>2</sub> O <sub>3</sub>	8.610	11.180	14.900	15.280	14.060	13.780	11.870	11.860
MnO	0.127	0.154	0.211	0.225	0.208	0.186	0.174	0.175
MgO	8.790	6.690	6.480	6.620	6.070	5.920	6.400	6.790
CaO	11.390	10.270	9.420	10.390	10.310	9.230	10.790	9.870
Na <sub>2</sub> O	1.740	3.330	3.160	2.760	3.470	3.750	3.640	3.680
K <sub>2</sub> O	1.210	0.162	0.131	0.114	0.083	0.390	0.048	0.271
P <sub>2</sub> O <sub>5</sub>	0.081	0.157	0.231	0.225	0.245	0.231	0.155	0.169
L.O.I.	3.54	2.92	2.57	2.68	2.50	3.06	4.15	3.00
Sum	94.460	95.290	96.000	95.550	96.270	96.100	94.160	95.680
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.040	0.412	0.268	0.197	0.174	0.382	0.261	0.697
Cu	0.006	0.003	0.003	0.007	0.005	0.006	0.006	0.006
Zn	0.005	0.009	0.011	0.012	0.011	0.011	0.009	0.009
Pb								
Ag								
Ba	0.008	0.003	0.004	0.003	0.000	0.014	0.005	0.005
V	0.020	0.031	0.042	0.044	0.041	0.040	0.032	0.034
Cr	0.025	0.018	0.008	0.012	0.010	0.011	0.017	0.018
Co								
Ni	0.014	0.009	0.007	0.007	0.007	0.006	0.007	0.007
Sr	0.013	0.018	0.016	0.020	0.020	0.017	0.014	0.012
Zr	0.008	0.013	0.019	0.021	0.019	0.018	0.013	0.013

Rock T.	105 G <sub>4</sub> (A <sub>alt</sub> -B <sub>4</sub> )	106 G <sub>1</sub> (A <sub>alt</sub> -B <sub>4</sub> )	107 G <sub>1</sub> (A)	108 G <sub>1</sub> (B <sub>1</sub> )	109 G <sub>1</sub> (B)	110 G <sub>1</sub> (B <sub>2</sub> )	111 G <sub>1</sub> (B <sub>2</sub> -B <sub>4</sub> )	112 G <sub>2</sub> (C <sub>1</sub> )
Sample	D18-21	D18-22	D18-23	D18-24	D18-25	D18-26	D18-27	D18-28
Loc. No.	(200-210m)	(210-220m)	(220-230m)	(230-240m)	(240-250m)	(250-260m)	(260-270m)	(290-300m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	49.400	46.280	45.720	46.410	46.410	47.630	46.010	43.990
TiO <sub>2</sub>	1.660	1.670	1.750	1.760	1.750	1.880	1.730	1.100
Al <sub>2</sub> O <sub>3</sub>	15.060	14.030	13.710	14.050	14.210	14.220	14.700	15.010
Fe <sub>2</sub> O <sub>3</sub>	11.840	11.720	12.720	12.080	12.020	12.140	12.110	9.410
MnO	0.142	0.170	0.185	0.171	0.169	0.160	0.147	0.141
MgO	7.550	6.310	6.190	6.170	6.320	6.700	7.000	8.840
CaO	5.410	11.360	11.130	10.650	10.140	8.510	8.200	12.030
Na <sub>2</sub> O	3.000	3.150	3.370	3.690	3.420	4.170	3.800	2.850
K <sub>2</sub> O	1.920	0.331	0.062	0.080	0.302	0.116	0.606	0.189
P <sub>2</sub> O <sub>5</sub>	0.161	0.159	0.168	0.168	0.160	0.190	0.186	0.095
L.O.I.	3.64	4.54	3.37	3.56	3.29	2.82	3.08	4.96
Sum	97.500	95.610	95.280	95.420	95.220	96.330	95.450	94.030
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	2.100	0.498	0.219	0.073	0.275	0.825	1.430	0.322
Cu	0.018	0.009	0.007	0.002	0.005	0.009	0.013	0.008
Zn	0.061	0.008	0.009	0.009	0.010	0.011	0.015	0.007
Pb								
Ag								
Ba	0.029	0.005	0.002	0.002	0.008	0.001	0.009	0.003
V	0.038	0.033	0.033	0.033	0.034	0.035	0.032	0.022
Cr	0.021	0.015	0.013	0.018	0.018	0.022	0.025	0.047
Co								
Ni	0.007	0.007	0.007	0.008	0.008	0.008	0.007	0.025
Sr	0.005	0.016	0.015	0.014	0.015	0.014	0.012	0.017
Zr	0.013	0.013	0.014	0.014	0.014	0.016	0.015	0.009

Rock T. Sample	113. G <sub>1</sub> (B <sub>1</sub> -B <sub>2</sub> ?) D7-1	114 G <sub>2</sub> (B <sub>6</sub> ) D7-2	115 G <sub>1</sub> (B <sub>4</sub> ?) D7-3	116 G <sub>1</sub> (A <sub>act</sub> -B <sub>2</sub> ) D7-4	117 G <sub>1</sub> (A <sub>ferro</sub> ) D7-5	118 G <sub>1</sub> (A) D7-6	119 G <sub>1</sub> (A) D7-7	120 G <sub>1</sub> (B <sub>1</sub> , D7-8
Loc.No.	(0-12.5m)	(12.5-18.5m)	(20-30m)	(30-40m)	(40-50m)	(62.5-64m)	(65-73m)	(75.5-89m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	47.740	38.650	47.370	45.840	46.710	46.140	45.680	44.970
TiO <sub>2</sub>	1.580	1.360	1.640	2.080	2.320	1.630	1.510	1.940
Al <sub>2</sub> O <sub>3</sub>	14.650	16.480	14.700	14.230	13.940	14.430	14.830	14.330
Fe <sub>2</sub> O <sub>3</sub>	11.200	22.580	10.660	13.730	14.400	12.130	11.550	12.730
MnO	0.156	0.154	0.137	0.186	0.201	0.179	0.164	0.181
MgO	6.320	9.200	6.700	6.110	6.230	7.180	7.760	7.300
CaO	10.240	2.160	9.430	10.490	9.350	10.450	10.010	9.220
Na <sub>2</sub> O	3.500	1.840	3.140	3.440	3.660	3.330	3.030	3.400
K <sub>2</sub> O	0.404	0.014	1.270	0.191	0.050	0.228	0.304	0.177
P <sub>2</sub> O <sub>5</sub>	0.127	0.139	0.157	0.221	0.228	0.155	0.148	0.188
L.O.I.	3.16	6.25	3.36	2.92	2.48	3.67	3.33	4.69
Sum	96.110	92.740	95.610	96.910	97.470	96.210	95.400	94.780
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.058	0.007	0.444	0.409	0.348	0.367	0.461	0.326
Cu	0.004	0.000	0.005	0.006	0.005	0.005	0.006	0.008
Zn	0.008	0.016	0.007	0.009	0.011	0.010	0.008	0.009
Pb								
Ag								
Ba	0.003	0.003	0.012	0.004	0.001	0.005	0.004	0.002
V	0.032	0.034	0.034	0.039	0.044	0.033	0.031	0.038
Cr	0.029	0.037	0.024	0.012	0.011	0.017	0.025	0.020
Co								
Ni	0.012	0.012	0.010	0.007	0.007	0.008	0.009	0.007
Sr	0.015	0.002	0.016	0.018	0.020	0.013	0.013	0.015
Zr	0.012	0.009	0.013	0.017	0.019	0.013	0.012	0.016

Rock T. Sample	121. G <sub>1</sub> (A <sub>act</sub> -B <sub>2</sub> ) D7-9	122 G <sub>1</sub> (A) D7-10	123 G <sub>1</sub> (A <sub>act</sub> ) D7-11	124 G <sub>1</sub> (A <sub>act</sub> -B <sub>2</sub> ) D7-12	125 G <sub>2</sub> (B <sub>2</sub> ?X <sub>2</sub> ?) D7-13	126 G <sub>1</sub> (A <sub>ferro</sub> ?) D7-14	127 G <sub>1</sub> (A <sub>ferro</sub> ) D7-15	128 G <sub>2</sub> (C <sub>2</sub> ) D7-16
Loc.No.	(89-100m)	(100-110m)	(110-120m)	(130-138.3)	(140-150m)	(160-170m)	(190-200m)	(200-210m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.450	44.780	44.750	44.280	46.910	44.990	44.030	44.520
TiO <sub>2</sub>	1.960	1.800	1.630	2.010	1.430	2.160	1.830	1.460
Al <sub>2</sub> O <sub>3</sub>	15.860	14.390	15.310	15.180	14.520	13.510	14.340	15.230
Fe <sub>2</sub> O <sub>3</sub>	11.390	11.590	11.640	13.230	10.470	14.140	12.810	11.570
MnO	0.150	0.186	0.167	0.173	0.158	0.201	0.191	0.173
MgO	5.560	5.830	6.570	7.320	7.140	6.740	7.980	8.910
CaO	9.560	12.020	11.200	8.340	9.630	10.500	10.820	10.170
Na <sub>2</sub> O	4.120	3.320	3.110	3.480	3.530	1.950	2.530	2.370
K <sub>2</sub> O	0.102	0.080	0.121	0.498	0.035	0.015	0.021	0.271
P <sub>2</sub> O <sub>5</sub>	0.232	0.218	0.173	0.211	0.126	0.216	0.149	0.139
L.O.I.	3.12	4.50	3.74	3.41	4.34	4.17	3.78	4.65
Sum	95.760	94.520	95.240	95.730	94.210	94.880	94.990	95.120
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.341	0.247	0.711	1.370	0.216	0.530	0.207	0.288
Cu	0.006	0.004	0.013	0.031	0.007	0.007	0.004	0.006
Zn	0.010	0.009	0.010	0.060	0.007	0.010	0.009	0.009
Pb								
Ag								
Ba	0.001	0.003	0.004	0.010	0.001	0.000	0.002	0.006
V	0.033	0.031	0.032	0.037	0.029	0.040	0.035	0.028
Cr	0.023	0.019	0.024	0.021	0.025	0.012	0.027	0.031
Co								
Ni	0.009	0.008	0.010	0.010	0.008	0.008	0.010	0.015
Sr	0.018	0.016	0.017	0.018	0.013	0.026	0.014	0.013
Zr	0.021	0.019	0.015	0.017	0.010	0.018	0.013	0.011

	129.	130.	131.	132	133	134	135.	136.
Rock T.	G <sub>3</sub> (C <sub>1</sub> -B <sub>1</sub> ?)	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> -C <sub>2</sub> ?)	G <sub>1</sub> (B <sub>1</sub> hydr.)	G <sub>1</sub> (B <sub>1</sub> hydr.)	G <sub>2</sub> (C <sub>1</sub> )	G <sub>1</sub> (B+A)	G <sub>1</sub> (A)
Sample	D7-17	D7-18	D62-1	D62-2	D62-3	D62-4	D62-5	D62-6
Loc. No.	(220-230m)	(230-240m)	(3-10)	(10-20m)	(20-30m)	(30-36m)	(38-50m)	(50-60m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	43.850	45.080	45.760	48.130	45.200	46.450	46.230	47.620
TiO <sub>2</sub>	1.540	1.180	1.330	1.520	1.660	1.270	1.610	1.710
Al <sub>2</sub> O <sub>3</sub>	16.140	15.920	15.790	15.220	14.550	16.050	13.840	14.070
Fe <sub>2</sub> O <sub>3</sub>	11.710	9.950	10.290	9.990	11.530	10.390	12.060	11.880
MnO	0.139	0.142	0.143	0.127	0.170	0.143	0.184	0.170
MgO	8.260	8.570	7.280	6.320	5.430	6.610	7.090	6.710
CaO	9.290	10.000	11.120	8.530	12.710	11.070	10.800	9.140
Na <sub>2</sub> O	2.660	2.810	2.820	3.990	3.190	2.560	2.890	3.820
K <sub>2</sub> O	0.166	0.486	0.370	0.790	0.068	0.900	0.189	0.089
P <sub>2</sub> O <sub>5</sub>	0.176	0.105	0.121	0.161	0.171	0.109	0.157	0.165
L.O.I.	3.68	3.97	3.44	2.79	3.10	2.88	2.95	2.89
Sum	94.310	94.500	95.290	95.200	95.020	95.830	95.380	95.680
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.381	0.132	0.162	0.461	0.303	0.172	0.296	0.255
Cu	0.006	0.008	0.005	0.005	0.006	0.010	0.006	0.004
Zn	0.008	0.007	0.007	0.008	0.008	0.007	0.009	0.009
Pb								
Ag								
Ba	0.006	0.012	0.004	0.004	0.004	0.008	0.004	0.004
V	0.031	0.024	0.026	0.031	0.033	0.026	0.031	0.033
Cr	0.027	0.036	0.031	0.030	0.025	0.030	0.018	0.022
Co								
Ni	0.014	0.019	0.011	0.013	0.012	0.015	0.007	0.008
Sr	0.021	0.015	0.015	0.010	0.017	0.014	0.014	0.015
Zr	0.012	0.010	0.010	0.012	0.013	0.009	0.012	0.014

	137	138	139.	140	141	142	143	144
Rock T.	G <sub>1</sub> (A)	G <sub>5</sub> (B <sub>1</sub> f)	G <sub>1</sub> (B <sub>2</sub> -B <sub>4</sub> ?)	G <sub>1</sub> (A+B)	G <sub>1</sub> (B <sub>2</sub> )	G <sub>1</sub> (B <sub>2</sub> )	G <sub>1</sub> (B <sub>2</sub> -B <sub>4</sub> )	G <sub>3</sub> (C <sub>2</sub> -B <sub>4</sub> ?)
Sample	D62-7	D62-8	D62-9	D62-10	D62-11	D62-12	D62-13	D62-14
Loc. No.	(60-73.5m)	(73.5-81.6m)	(81.6-90m)	(90-100m)	(100-110m)	(110-117m)	(117-124.5m)	(125-139m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.140	35.060	45.790	45.800	46.280	45.370	47.430	44.910
TiO <sub>2</sub>	1.790	2.030	1.610	2.010	1.920	1.830	1.620	1.360
Al <sub>2</sub> O <sub>3</sub>	13.730	14.700	14.180	15.010	15.750	15.530	15.980	16.330
Fe <sub>2</sub> O <sub>3</sub>	11.940	14.940	10.740	12.310	12.250	11.820	11.510	10.360
MnO	0.175	0.141	0.143	0.159	0.163	0.189	0.203	0.128
MgO	5.770	18.820	7.350	6.030	5.840	5.890	7.290	8.050
CaO	10.600	4.530	9.000	9.280	9.920	10.030	7.380	9.210
Na <sub>2</sub> O	3.730	0.392	3.990	3.880	3.740	3.650	3.970	3.140
K <sub>2</sub> O	0.031	0.082	0.625	0.094	0.038	0.176	0.669	0.497
P <sub>2</sub> O <sub>5</sub>	0.175	0.218	0.171	0.238	0.237	0.231	0.170	0.124
L.O.I.	3.45	7.37	4.46	3.06	2.44	2.63	3.12	3.75
Sum	93.460	91.070	94.260	95.410	96.660	95.300	97.270	94.570
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.403	0.005	0.920	0.766	0.625	0.738	1.560	0.523
Cu	0.006	0.000	0.014	0.006	0.007	0.006	0.035	0.008
Zn	0.009	0.012	0.009	0.010	0.010	0.009	0.019	0.011
Pb								
Ag								
Ba	0.002	0.004	0.009	0.001	0.000	0.004	0.009	0.006
V	0.035	0.039	0.031	0.035	0.034	0.034	0.031	0.028
Cr	0.022	0.020	0.023	0.021	0.022	0.023	0.024	0.036
Co								
Ni	0.008	0.010	0.007	0.009	0.009	0.009	0.010	0.020
Sr	0.020	0.001	0.011	0.018	0.022	0.020	0.010	0.015
Zr	0.014	0.017	0.013	0.020	0.020	0.019	0.014	0.010

Rock T.	145	146	147	148	149	150	151	152
Sample	G <sub>1</sub> (B <sub>1</sub> -B <sub>4</sub> ?) D31-1	G <sub>3</sub> (C <sub>2</sub> ?) D31-2	G <sub>1</sub> (B <sub>1</sub> ) D31-3	G <sub>1</sub> (B <sub>1</sub> -B <sub>2</sub> ) D31-4	G <sub>3</sub> (C <sub>1</sub> ) D31-5	G <sub>1</sub> (B <sub>1</sub> ) D31-6	G <sub>1</sub> (B <sub>1</sub> ferro) D31-7	G <sub>3</sub> (Hybr.) D31-8
Loc. No.	(3-10m)	(10-20m)	(20-30m)	(30-44m)	(44-50m)	(60-70m)	(70-80m)	(80-90m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.670	46.780	46.410	47.110	43.660	45.470	46.640	43.460
TiO <sub>2</sub>	1.580	1.350	1.630	2.050	1.540	1.570	1.740	1.260
Al <sub>2</sub> O <sub>3</sub>	14.860	16.240	14.910	15.530	15.610	15.450	14.050	14.580
Fe <sub>2</sub> O <sub>3</sub>	11.240	10.960	10.880	12.490	10.390	11.820	12.700	9.920
MnO	0.196	0.158	0.157	0.169	0.154	0.172	0.193	0.167
MgO	6.640	7.120	5.820	5.630	5.470	7.490	6.830	6.740
CaO	10.700	10.450	10.790	9.760	13.500	10.320	10.130	14.280
Na <sub>2</sub> O	3.190	2.570	3.810	4.060	3.180	2.720	3.210	2.560
K <sub>2</sub> O	0.422	0.909	0.263	0.034	0.130	0.278	0.120	0.207
P <sub>2</sub> O <sub>5</sub>	0.147	0.135	0.182	0.288	0.178	0.153	0.175	0.121
L.O. I.	3.41	2.88	4.26	3.15	5.55	2.85	2.53	5.63
Sum	96.050	96.960	95.120	97.450	94.170	95.710	96.100	93.490
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.416	0.177	0.187	0.229	0.345	0.187	0.260	0.091
Cu	0.007	0.008	0.008	0.007	0.007	0.005	0.004	0.007
Zn	0.008	0.008	0.008	0.010	0.007	0.007	0.010	0.006
Pb								
Ag								
Ba	0.005	0.011	0.004	0.001	0.003	0.006	0.003	0.003
V	0.030	0.027	0.029	0.036	0.030	0.030	0.034	0.024
Cr	0.030	0.031	0.026	0.028	0.026	0.025	0.016	0.026
Co								
Ni	0.009	0.011	0.010	0.009	0.010	0.011	0.008	0.010
Sr	0.018	0.015	0.016	0.023	0.020	0.018	0.019	0.020
Zr	0.013	0.013	0.016	0.021	0.015	0.013	0.015	0.011

Rock T.	153	154	155	156	157	158	159	160
Sample	G <sub>1</sub> (B <sub>1</sub> ) D31-9	G <sub>1</sub> (B <sub>1</sub> ferro) D31-10	G <sub>1</sub> (C <sub>1</sub> ?) D31-11	G <sub>3</sub> (C <sub>2</sub> ) D31-12	G <sub>3</sub> (C <sub>2</sub> ) D31-13	G <sub>3</sub> (C <sub>2</sub> ) D31-14	G <sub>3</sub> (C <sub>2</sub> ) D31-15	G <sub>1</sub> (B <sub>1</sub> ferro) D31-16
Loc. No.	(90-100m)	(100-107.5m)	(123-136m)	(140-150m)	(150-160m)	(160-170m)	(170-183m)	(183-190m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.360	45.600	47.210	46.670	46.110	46.080	45.490	44.850
TiO <sub>2</sub>	1.620	2.130	1.250	1.050	1.020	1.080	0.958	1.860
Al <sub>2</sub> O <sub>3</sub>	15.170	14.010	14.520	16.350	15.530	15.230	15.730	14.760
Fe <sub>2</sub> O <sub>3</sub>	11.500	14.440	10.900	9.310	9.590	9.780	9.260	12.320
MnO	0.176	0.203	0.156	0.138	0.141	0.144	0.141	0.175
MgO	6.230	6.660	6.580	8.350	8.310	8.940	8.170	5.270
CaO	11.490	10.050	11.240	10.310	10.990	11.950	11.690	12.400
Na <sub>2</sub> O	3.260	2.860	3.220	2.150	2.200	2.320	2.290	3.010
K <sub>2</sub> O	0.110	0.022	0.378	1.340	1.040	0.217	0.520	0.113
P <sub>2</sub> O <sub>5</sub>	0.169	0.210	0.097	0.067	0.077	0.087	0.074	0.192
L.O. I.	3.92	3.05	3.70	3.15	3.76	3.05	3.82	4.19
Sum	95.410	96.610	95.810	96.040	95.290	96.070	94.540	95.380
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.274	0.473	0.160	0.276	0.228	0.149	0.101	0.471
Cu	0.008	0.008	0.005	0.007	0.004	0.010	0.007	0.006
Zn	0.007	0.009	0.007	0.007	0.007	0.006	0.006	0.009
Pb								
Ag								
Ba	0.003	0.003	0.004	0.007	0.010	0.003	0.004	0.001
V	0.031	0.039	0.026	0.023	0.022	0.021	0.019	0.034
Cr	0.022	0.011	0.032	0.031	0.035	0.031	0.030	0.021
Co								
Ni	0.009	0.007	0.011	0.015	0.014	0.017	0.017	0.010
Sr	0.022	0.016	0.016	0.011	0.012	0.013	0.013	0.027
Zr	0.014	0.019	0.010	0.007	0.009	0.009	0.008	0.015

Rock T.	161	162	163	164	165	166	167	168
Sample	G <sub>3</sub> (C <sub>2</sub> ) D31-17	G <sub>3</sub> (C <sub>2</sub> ) D31-18	G <sub>3</sub> (C <sub>2</sub> ) D31-19	G <sub>1</sub> (B <sub>1</sub> -B <sub>4</sub> ?) D31-20	G <sub>1</sub> (B <sub>ferro</sub> ) D31-21	G <sub>1</sub> (B <sub>ferro</sub> ) D31-22	G <sub>1</sub> (B <sub>ferro</sub> ) D31-23	G <sub>1</sub> (B <sub>ferro</sub> ) D31-24
Loc.No.	(190-200m)	(200-210m)	(210-220m)	(220-230m)	(230-240m)	(240-250m)	(250-260m)	(260-270m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	43.820	45.140	44.510	47.640	44.480	46.310	45.870	46.000
TiO <sub>2</sub>	1.190	1.270	1.630	1.470	1.800	1.840	2.000	2.000
Al <sub>2</sub> O <sub>3</sub>	15.850	15.550	14.260	15.510	15.160	13.990	13.730	14.650
Fe <sub>2</sub> O <sub>3</sub>	11.090	10.720	11.650	10.680	13.250	12.560	13.530	12.360
MnO	0.164	0.158	0.173	0.145	0.188	0.184	0.200	0.165
MgO	9.700	8.940	5.900	6.350	6.390	6.320	6.940	7.260
CaO	11.010	11.370	12.930	10.810	11.430	10.580	11.170	9.430
Na <sub>2</sub> O	1.340	1.950	3.120	3.320	2.790	3.340	2.920	3.500
K <sub>2</sub> O	0.864	0.600	0.233	0.697	0.320	0.453	0.097	0.134
P <sub>2</sub> O <sub>5</sub>	0.081	0.106	0.155	0.145	0.178	0.180	0.195	0.209
L.O.I.	3.36	3.26	4.70	2.71	3.05	3.67	2.58	2.94
Sum	95.420	96.100	94.920	97.230	96.340	96.080	96.980	96.030
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.222	0.222	0.351	0.532	0.273	0.278	0.226	0.230
Cu	0.020	0.009	0.007	0.005	0.007	0.008	0.007	0.005
Zn	0.007	0.008	0.008	0.008	0.010	0.009	0.009	0.009
Pb								
Ag								
Ba	0.006	0.007	0.000	0.006	0.006	0.009	0.005	0.003
V	0.023	0.025	0.032	0.028	0.033	0.034	0.036	0.035
Cr	0.030	0.031	0.021	0.026	0.025	0.019	0.025	0.026
Co								
Ni	0.019	0.018	0.010	0.012	0.012	0.008	0.008	0.007
Sr	0.012	0.013	0.019	0.016	0.024	0.018	0.018	0.016
Zr	0.010	0.010	0.013	0.013	0.016	0.016	0.017	0.018

Rock T.	169	170	171	172	173	174	175	176
Sample	G <sub>1</sub> (B <sub>2</sub> ) D31-25	G <sub>1</sub> (B <sub>ferro</sub> ) D31-26	G <sub>1</sub> (A+B) D31-27	G <sub>1</sub> (B <sub>2</sub> ) D31-28	G <sub>3</sub> (C <sub>1</sub> ) D31-29	G <sub>3</sub> (C <sub>1</sub> ) D52-1	G <sub>3</sub> (C <sub>1</sub> ) D52-2	G <sub>3</sub> (C <sub>1</sub> ) D52-3
Loc.No.	(270-280m)	(280-290m)	(290-300m)	(300-310m)	(340-350m)	(0-10m)	(10-20m)	(20-30m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.390	46.810	46.990	47.930	45.140	45.020	46.620	46.080
TiO <sub>2</sub>	1.950	1.950	1.850	1.740	1.140	1.330	1.190	1.270
Al <sub>2</sub> O <sub>3</sub>	15.540	15.080	14.770	15.520	16.260	16.150	15.280	15.240
Fe <sub>2</sub> O <sub>3</sub>	12.270	12.460	12.350	11.190	9.960	10.000	10.060	10.530
MnO	0.197	0.189	0.190	0.158	0.142	0.138	0.152	0.150
MgO	6.390	7.070	7.280	6.140	9.700	6.980	6.800	5.800
CaO	7.350	9.100	8.690	9.500	10.030	10.790	12.100	11.990
Na <sub>2</sub> O	4.330	3.430	3.740	4.070	2.410	2.730	2.840	3.220
K <sub>2</sub> O	0.252	0.351	0.038	0.023	0.313	0.857	0.235	0.256
P <sub>2</sub> O <sub>5</sub>	0.243	0.229	0.224	0.198	0.094	0.110	0.086	0.100
L.O.I.	3.19	2.59	2.63	3.50	3.18	4.28	3.17	3.81
Sum	95.660	97.180	96.500	96.850	95.420	94.380	95.590	94.920
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	1.060	0.618	0.343	0.409	0.075	0.189	0.129	0.203
Cu	0.010	0.007	0.004	0.005	0.009	0.007	0.008	0.009
Zn	0.009	0.010	0.011	0.009	0.006	0.007	0.006	0.007
Pb								
Ag								
Ba	0.003	0.004	0.002	0.001	0.007	0.007	0.002	0.002
V	0.032	0.033	0.031	0.030	0.021	0.027	0.024	0.026
Cr	0.021	0.023	0.024	0.025	0.035	0.034	0.032	0.029
Co								
Ni	0.008	0.008	0.010	0.010	0.024	0.014	0.011	0.011
Sr	0.014	0.023	0.014	0.017	0.021	0.014	0.015	0.014
Zr	0.021	0.020	0.020	0.018	0.011	0.010	0.008	0.009

Rock T.	177. G <sub>1</sub> (B-B <sub>4</sub> ?)	178 G <sub>1</sub> (A <sub>act</sub> =B <sub>4</sub> ?)	179 G <sub>1</sub> (A <sub>ferro</sub> )	180 G <sub>1</sub> (A <sub>ferro</sub> )	181 G <sub>1</sub> (A <sub>ferro</sub> )	182 G <sub>1</sub> (A <sub>ferro</sub> )	183 G <sub>1</sub> (A <sub>act</sub> =B <sub>2</sub> )	184 G <sub>1</sub> (A <sub>act</sub> )
Sample	D52-4	D52-5	D52-6	D52-7	D52-8	D52-9	D52-10	D52-11
Loc. No.	(30-38.45m)	(40-50m)	(50-60m)	(60-70m)	(70-80m)	(80-94.10m)	(96.55-106.80m)	(109-120m)
Coord. X								
	Y							
	Z							
%								
SiO <sub>2</sub>	46.510	45.540	45.910	45.850	46.440	46.960	47.140	46.070
TiO <sub>2</sub>	1.780	1.800	2.210	2.250	2.250	2.250	1.800	1.880
Al <sub>2</sub> O <sub>3</sub>	14.990	14.550	14.040	13.330	13.450	13.490	13.890	13.160
Fe <sub>2</sub> O <sub>3</sub>	11.580	11.970	13.730	14.050	14.280	13.130	11.350	12.890
MnO	0.160	0.163	0.189	0.201	0.207	0.176	0.148	0.181
MgO	5.930	6.630	5.980	5.590	5.760	6.870	7.320	6.820
CaO	10.600	10.560	10.320	10.920	10.350	8.790	8.550	10.260
Na <sub>2</sub> O	3.240	3.230	3.350	3.400	3.270	3.480	3.940	3.300
K <sub>2</sub> O	0.691	0.534	0.194	0.159	0.143	0.421	0.502	0.027
P <sub>2</sub> O <sub>5</sub>	0.156	0.192	0.225	0.234	0.234	0.219	0.180	0.175
L.O.I.	3.35	3.52	2.87	2.65	1.98	2.83	4.22	2.77
Sum	95.880	95.610	96.460	96.320	96.640	96.100	95.260	95.150
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.100	0.485	0.237	0.329	0.148	0.242	0.523	0.370
Cu	0.005	0.005	0.006	0.005	0.003	0.004	0.008	0.012
Zn	0.008	0.010	0.010	0.010	0.011	0.010	0.009	0.009
Pb								
Ag								
Ba	0.004	0.005	0.002	0.004	0.004	0.005	0.005	0.003
V	0.034	0.034	0.041	0.039	0.040	0.040	0.034	0.035
Cr	0.029	0.019	0.016	0.009	0.010	0.010	0.016	0.018
Co								
Ni	0.013	0.009	0.009	0.006	0.006	0.006	0.007	0.008
Sr	0.019	0.017	0.020	0.018	0.016	0.016	0.010	0.015
Zr	0.013	0.015	0.018	0.019	0.019	0.018	0.014	0.015

Rock T.	185 G <sub>1</sub> (B <sub>1</sub> )	186 G <sub>1</sub> (B <sub>1</sub> )	187 G <sub>1</sub> (B <sub>2</sub> )	188 G <sub>3</sub> (C <sub>1</sub> -C <sub>2</sub> ?)	189 G <sub>1</sub> (B <sub>1</sub> )	190 G <sub>3</sub> (C <sub>1</sub> )	191 G <sub>1</sub> (B <sub>2</sub> )	192 G <sub>1</sub> (B <sub>2</sub> )
Sample	D52-12	D52-13	D52-14	D52-15	D52-16	D52-17	D52-18	D52-19
Loc. No.	(120-130m)	(130-140m)	(144.8-160m?)	(160-170m)	(170-180m)	(180-190m)	(190-200m)	(200-210m)
Coord. X								
	Y							
	Z							
%								
SiO <sub>2</sub>	47.050	46.680	47.470	44.910	47.750	46.520	47.210	48.000
TiO <sub>2</sub>	1.500	1.560	1.440	1.520	1.520	1.510	1.770	1.640
Al <sub>2</sub> O <sub>3</sub>	16.280	15.660	15.850	16.430	16.420	16.540	15.700	16.230
Fe <sub>2</sub> O <sub>3</sub>	10.620	11.200	9.760	10.810	10.230	10.360	11.730	11.210
MnO	0.153	0.158	0.142	0.160	0.142	0.146	0.161	0.149
MgO	5.180	5.560	4.070	5.280	5.300	4.960	5.480	4.920
CaO	11.460	11.940	11.350	12.380	11.320	11.930	9.290	9.310
Na <sub>2</sub> O	3.360	3.210	4.170	3.070	3.540	3.540	4.270	4.050
K <sub>2</sub> O	0.233	0.081	0.130	0.103	0.201	0.052	0.038	0.034
P <sub>2</sub> O <sub>5</sub>	0.170	0.167	0.191	0.166	0.159	0.178	0.287	0.259
L.O.I.	2.28	2.55	3.66	2.97	2.13	2.68	3.29	2.58
Sum	96.280	96.510	94.940	95.180	96.910	96.030	96.310	96.170
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.171	0.219	0.408	0.317	0.266	0.248	0.389	0.345
Cu	0.006	0.008	0.009	0.007	0.007	0.007	0.005	0.008
Zn	0.008	0.008	0.008	0.007	0.007	0.007	0.011	0.009
Pb								
Ag								
Ba	0.004	0.002	0.003	0.003	0.006	0.001	0.002	0.001
V	0.028	0.029	0.024	0.028	0.029	0.028	0.027	0.027
Cr	0.028	0.025	0.021	0.028	0.029	0.028	0.024	0.024
Co								
Ni	0.010	0.010	0.008	0.011	0.010	0.011	0.009	0.010
Sr	0.016	0.018	0.014	0.017	0.017	0.014	0.013	0.014
Zr	0.013	0.014	0.025	0.014	0.014	0.014	0.024	0.021

Rock T.	193 G <sub>1</sub> (A)	194 G <sub>1</sub> (A <sub>ad</sub> -B <sub>2</sub> )	195 G <sub>1</sub> (B <sub>2</sub> -B <sub>4</sub> ?)	196 G <sub>4</sub> (B <sub>4</sub> )	197 G <sub>3</sub> (C <sub>1</sub> )	198 G <sub>4</sub> (B <sub>4</sub> )	199 G <sub>2</sub> (B <sub>cd</sub> )	200 G <sub>3</sub> (C <sub>1-b</sub> ?)
Sample	D52-20	D52-21	D52-22	D52-23	D52-24	2027-1	2027-2	2027-3
Loc.No.	(210-220m)	(220-230m)	(230-240m)	(250-260m)	(260-270m)	(6-12m)	(12.5-18m)	(23-25m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.600	47.450	45.320	45.750	45.330	47.520	38.170	46.780
TiO <sub>2</sub>	1.710	1.680	1.880	1.130	1.180	1.420	2.080	1.180
Al <sub>2</sub> O <sub>3</sub>	14.950	14.970	14.910	18.310	15.440	18.120	17.180	15.870
Fe <sub>2</sub> O <sub>3</sub>	12.060	11.970	12.980	9.080	10.230	10.340	22.220	9.560
MnO	0.171	0.166	0.171	0.146	0.146	0.148	0.154	0.115
MgO	6.800	7.150	8.070	8.800	9.610	7.190	7.550	7.180
CaO	10.010	9.130	6.310	5.610	10.230	3.050	1.720	9.760
Na <sub>2</sub> O	3.210	3.360	3.790	2.770	2.300	3.340	3.050	3.190
K <sub>2</sub> O	0.023	0.031	0.243	1.910	0.293	2.640	1.330	1.170
P <sub>2</sub> O <sub>5</sub>	0.174	0.172	0.188	0.109	0.096	0.115	0.142	0.111
L.O.I.	3.42	3.20	4.08	4.75	3.35	6.55	6.86	3.49
Sum	96.060	96.570	94.580	94.650	95.120	96.300	96.770	95.470
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.334	0.607	1.030	1.570	0.116	4.120	5.150	0.660
Cu	0.004	0.005	0.011	0.013	0.009	0.016	0.166	0.012
Zn	0.010	0.012	0.023	0.024	0.006	0.042	0.070	0.023
Pb								
Ag								
Ba	0.003	0.004	0.003	0.008	0.005	0.013	0.011	0.008
V	0.033	0.033	0.033	0.025	0.021	0.026	0.038	0.022
Cr	0.030	0.025	0.015	0.033	0.049	0.027	0.028	0.029
Co								
Ni	0.010	0.008	0.007	0.015	0.025	0.015	0.010	0.014
Sr	0.012	0.011	0.010	0.006	0.016	0.004	0.002	0.014
Zr	0.014	0.013	0.016	0.009	0.010	0.011	0.016	0.010

Rock T.	201 G <sub>3</sub> (C <sub>1</sub> )	202 G <sub>3</sub> (C <sub>1</sub> )	203 G <sub>3</sub> (C <sub>1</sub> )	204 G <sub>3</sub> (C <sub>1</sub> )	205 G <sub>3</sub> (C <sub>1</sub> )	206 G <sub>4</sub> (B <sub>cd</sub> )	207 G <sub>1</sub> (B <sub>1</sub> )	208 G <sub>1</sub> (B <sub>2</sub> )
Sample	2027-4	2027-5	2027-6	2027-7	480- $\phi$ H-1	480- $\phi$ H-3	480- $\phi$ H-7	480- $\phi$ H-8
Loc.No.	(23.4-30m)	(30-40m)	(40-50m)	(50-58m)	for coordinates see TABLE B-5			
Coord. X					Mine samples!			
Y								
Z								
%								
SiO <sub>2</sub>	43.500	42.450	44.530	46.090	44.520	47.140	45.410	48.420
TiO <sub>2</sub>	1.210	1.080	1.140	1.050	1.050	1.110	1.740	1.320
Al <sub>2</sub> O <sub>3</sub>	15.750	17.880	15.470	14.920	15.670	14.470	14.690	14.920
Fe <sub>2</sub> O <sub>3</sub>	9.810	9.960	10.250	9.790	9.240	20.940	12.480	9.480
MnO	0.149	0.138	0.146	0.146	0.144	0.176	0.196	0.104
MgO	7.320	8.810	8.160	8.810	6.680	7.590	7.910	7.350
CaO	12.340	9.160	11.000	10.140	11.880	1.060	9.820	8.780
Na <sub>2</sub> O	2.510	1.380	2.730	2.620	3.450	1.870	2.860	3.850
K <sub>2</sub> O	0.422	1.860	0.340	0.398	0.172	0.071	0.039	0.460
P <sub>2</sub> O <sub>5</sub>	0.100	0.074	0.105	0.085	0.085	0.081	0.161	0.101
L.O.I.	5.05	4.44	3.68	4.23	5.75	5.35	2.78	3.10
Sum	93.370	93.050	94.270	94.290	93.080	95.140	95.580	95.550
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.151	0.096	0.409	0.170	0.102	0.514	0.200	1.130
Cu	0.008	0.003	0.010	0.003	0.005	0.154	0.005	0.013
Zn	0.007	0.010	0.008	0.007	0.007	0.055	0.008	0.008
Pb								
Ag								
Ba	0.005	0.019	0.006	0.004	0.002	0.002	0.002	0.004
V	0.023	0.024	0.024	0.022	0.020	0.026	0.032	0.027
Cr	0.034	0.041	0.036	0.034	0.031	0.029	0.019	0.022
Co								
Ni	0.015	0.021	0.017	0.016	0.017	0.008	0.009	0.009
Sr	0.020	0.012	0.016	0.011	0.016	0.002	0.021	0.019
Zr	0.009	0.008	0.009	0.008	0.008	0.008	0.015	0.009

	209	210	211	212	213	214	215	216
Rock T.	G5(B4)	G2(B6e-f?)	G4(B2?)	G4(B4)	G3(C1-b)	G3(C1b)	G3(C1?)G4?	G5(B4)
Sample	480-ØH-9	480-ØH12	480-ØH13	402-ØL-2	402-ØL-4	402-ØL-5	402-ØL-6	387-ØF-1
Loc.No.								
Coord. X								
Y								
Z								
%								
SiO2	43.510	32.820	51.250	49.670	45.550	45.090	43.880	42.590
TiO2	1.170	0.997	1.880	1.050	1.100	1.230	1.180	1.140
Al2O3	20.550	18.320	14.780	17.890	17.130	16.220	18.820	15.840
Fe2O3	8.660	23.870	10.510	11.610	9.950	10.200	9.700	13.930
MnO	0.137	0.165	0.116	0.092	0.138	0.147	0.091	0.233
MgO	10.870	12.110	5.650	5.170	6.960	6.740	6.350	12.620
CaO	2.330	0.892	5.450	1.640	10.460	11.460	6.660	3.340
Na2O	3.180	1.860	6.100	4.660	3.450	3.310	4.120	2.490
K2O	1.910	0.030	0.049	2.130	0.094	0.018	1.720	0.934
P2O5	0.086	0.084	0.186	0.093	0.100	0.102	0.094	0.104
L.O.I.	6.23	6.86	2.69	6.40	3.53	4.03	5.85	6.08
Sum	93.240	91.330	96.420	97.170	95.460	94.770	93.610	94.590
CO2								
H2O+								
H2O-								
S	1.120	0.013	0.578	5.380	0.649	0.146	1.500	1.610
Cu	0.032	0.002	0.008	0.037	0.007	0.005	0.017	0.028
Zn	0.056	0.039	0.008	0.135	0.010	0.007	0.021	0.359
Pb								
Ag								
Ba	0.010	0.004	0.003	0.013	0.001	0.002	0.007	0.010
V	0.024	0.023	0.032	0.024	0.023	0.026	0.026	0.026
Cr	0.041	0.038	0.015	0.032	0.032	0.032	0.035	0.029
Co								
Ni	0.019	0.011	0.007	0.014	0.017	0.010	0.018	0.010
Sr	0.003	0.002	0.005	0.004	0.020	0.020	0.011	0.002
Zr	0.008	0.006	0.014	0.007	0.009	0.009	0.009	0.009

	217	218	219	220	221	222	223	244
Rock T.	G5(B3)	G4(B4)	G2(B6d)	G2(B6c)	G3(C1)	G5(B4)	G1(B4)	G1(B1-b?)
Sample	387-ØF-2	560-1	560-2	560-3	560-4	560-5	560-6	560-7
Loc.No.								
Coord. X								
Y								
Z								
%								
SiO2	43.530	47.390	35.800	27.820	47.120	42.240	44.020	46.000
TiO2	2.100	1.310	1.180	1.160	1.040	1.980	1.970	1.640
Al2O3	15.600	16.180	16.620	16.960	15.380	17.460	16.850	17.440
Fe2O3	14.660	11.560	26.070	33.600	8.550	15.980	13.000	8.870
MnO	0.146	0.350	0.229	0.189	0.098	0.216	0.137	0.119
MgO	9.190	8.400	8.840	9.710	8.660	7.780	7.020	3.380
CaO	5.250	2.760	0.992	1.120	9.890	1.670	5.710	10.360
Na2O	3.930	2.830	2.220	0.461	1.880	1.680	3.640	5.560
K2O	0.022	1.490	0.024	0.141	1.710	3.090	0.613	0.043
P2O5	0.222	0.113	0.106	0.071	0.077	0.157	0.208	0.310
L.O.I.	4.59	6.52	7.13	7.10	3.10	8.53	6.64	5.37
Sum	95.380	93.940	93.520	91.820	94.670	95.980	95.160	94.160
CO2								
H2O+								
H2O-								
S	1.080	2.540	2.230	0.702	0.213	6.030	3.340	0.447
Cu	0.007	0.007	0.068	0.054	0.009	0.035	0.006	0.006
Zn	0.018	0.059	0.053	0.023	0.006	0.292	0.038	0.009
Pb								
Ag								
Ba	0.000	0.008	0.004	0.004	0.008	0.014	0.005	0.000
V	0.040	0.030	0.027	0.026	0.023	0.037	0.039	0.032
Cr	0.014	0.032	0.033	0.035	0.030	0.034	0.026	0.031
Co								
Ni	0.008	0.011	0.009	0.009	0.012	0.014	0.011	0.014
Sr	0.009	0.003	0.001	0.001	0.010	0.001	0.009	0.021
Zr	0.016	0.009	0.008	0.009	0.008	0.015	0.015	0.013

	225	226	227	228	229	230	231	232
Rock T.	G <sub>4</sub> (B <sub>4</sub> )	G <sub>3</sub> (C-Aalt?)	G <sub>3</sub> (C)	G <sub>3</sub> (C <sub>2</sub> -B <sub>1</sub> ?)	G <sub>3</sub> (C <sub>1</sub> -B <sub>1</sub> ?)	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>1</sub> )
Sample	560-9	D32-1	D32-2	D32-3	D32-4	D32-5	D32-6	D32-7
Loc.No.		(3.50-10m)	(10-20m)	(20-30m)	(30-40m)	(40-50m)	(50-60m)	(60-70m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	49.420	44.330	45.010	46.220	45.850	45.860	44.910	44.670
TiO <sub>2</sub>	2.070	1.140	1.170	1.360	1.420	1.150	1.090	1.280
Al <sub>2</sub> O <sub>3</sub>	16.810	16.270	15.270	14.510	15.780	15.900	16.460	15.610
Fe <sub>2</sub> O <sub>3</sub>	12.440	9.860	9.970	10.990	10.770	10.370	9.650	10.030
MnO	0.194	0.150	0.151	0.159	0.149	0.150	0.143	0.141
MgO	7.250	9.740	8.050	8.080	6.120	6.650	8.220	6.840
CaO	1.780	10.630	11.120	10.550	11.110	11.090	11.480	11.010
Na <sub>2</sub> O	3.210	1.160	2.200	2.780	3.120	2.980	2.170	2.630
K <sub>2</sub> O	1.910	1.350	0.650	0.305	0.226	0.278	0.528	0.918
P <sub>2</sub> O <sub>5</sub>	0.187	0.077	0.093	0.103	0.173	0.100	0.082	0.105
L.O.I.	6.35	3.34	3.54	3.19	2.90	3.12	3.38	3.76
Sum	97.680	94.870	93.870	95.290	95.040	94.790	94.950	93.490
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	3.890	0.024	0.090	0.135	0.258	0.160	0.096	0.179
Cu	0.010	0.005	0.007	0.007	0.010	0.006	0.007	0.004
Zn	0.147	0.007	0.008	0.008	0.008	0.008	0.006	0.007
Pb								
Ag								
Ba	0.010	0.007	0.003	0.004	0.003	0.003	0.006	0.006
V	0.038	0.020	0.021	0.027	0.027	0.025	0.022	0.025
Cr	0.031	0.023	0.022	0.025	0.030	0.035	0.032	0.034
Co								
Ni	0.011	0.016	0.012	0.008	0.009	0.010	0.017	0.013
Sr	0.002	0.011	0.012	0.012	0.014	0.014	0.015	0.012
Zr	0.015	0.010	0.010	0.011	0.016	0.010	0.009	0.009

	233	234	235	236	237	238	239	240
Rock T.	G <sub>1</sub> (B <sub>1</sub> hybr.)	G <sub>1</sub> (A)	G <sub>3</sub> (C <sub>2</sub> -A?)	G <sub>1</sub> (A)	G <sub>3</sub> (C <sub>1</sub> hybr.)	G <sub>1</sub> (A+Bferro)	G <sub>1</sub> (Aferro)	G <sub>1</sub> (Aferro)
Sample	D32-8	D32-9	D32-10	D32-11	D32-12	D32-13	D32-14	D32-15
Loc.No.	(70-80m)	(80-90m)	(90-100m)	(100-110m)	(110-120m)	(120-130m)	(130-140m)	(140-150m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.880	44.850	43.050	45.760	46.710	47.300	45.500	43.880
TiO <sub>2</sub>	1.530	1.810	1.730	1.710	1.100	2.060	2.220	2.160
Al <sub>2</sub> O <sub>3</sub>	14.550	14.180	14.590	14.740	14.320	14.780	13.600	13.660
Fe <sub>2</sub> O <sub>3</sub>	11.810	12.950	12.610	12.560	9.920	12.820	13.930	13.080
MnO	0.173	0.196	0.182	0.173	0.158	0.177	0.202	0.189
MgO	6.500	6.650	6.760	6.160	6.830	5.830	6.090	5.820
CaO	11.310	11.010	11.930	10.760	11.970	9.870	10.680	10.350
Na <sub>2</sub> O	2.980	2.710	2.500	3.120	2.930	3.760	3.320	3.280
K <sub>2</sub> O	0.249	0.034	0.056	0.237	0.410	0.116	0.063	0.060
P <sub>2</sub> O <sub>5</sub>	0.141	0.183	0.158	0.155	0.093	0.212	0.226	0.236
L.O.I.	2.98	2.56	3.75	3.15	3.33	2.44	2.56	2.86
Sum	95.370	94.820	93.840	95.780	94.650	97.300	96.130	93.020
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.129	0.105	0.203	0.439	0.126	0.381	0.213	0.228
Cu	0.004	0.003	0.005	0.010	0.002	0.004	0.005	0.005
Zn	0.009	0.009	0.009	0.009	0.007	0.010	0.010	0.010
Pb								
Ag								
Ba	0.003	0.001	0.002	0.003	0.007	0.002	0.004	0.000
V	0.030	0.034	0.034	0.033	0.023	0.038	0.040	0.038
Cr	0.031	0.022	0.028	0.021	0.024	0.013	0.016	0.015
Co								
Ni	0.014	0.010	0.013	0.011	0.011	0.006	0.008	0.008
Sr	0.016	0.018	0.022	0.016	0.013	0.020	0.022	0.024
Zr	0.012	0.014	0.014	0.013	0.009	0.017	0.019	0.019

Rock T.	241 G <sub>1</sub> (A)	242 G <sub>1</sub> (B)	243 G <sub>1</sub> (B)	244 G <sub>1</sub> (A)	245 G <sub>1</sub> (A)	246 G <sub>1</sub> (B)	247 G <sub>1</sub> (B <sub>2</sub> )	248 G <sub>1</sub> (B <sub>2</sub> )
Sample	D32-16	D32-17	D32-18	D32-19	D32-20	D32-21	D32-22	D32-23
Loc. No.	(150-160m)	(160-170m)	(170-180m)	(180-190m)	(190-200m)	(200-210m)	(210-220m)	(220-230m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.350	47.150	46.320	47.470	46.140	47.050	47.470	46.720
TiO <sub>2</sub>	2.250	1.850	1.840	1.810	1.750	1.890	1.940	1.650
Al <sub>2</sub> O <sub>3</sub>	13.780	13.950	13.670	13.490	13.550	13.810	14.530	15.070
Fe <sub>2</sub> O <sub>3</sub>	13.600	11.890	12.280	12.140	12.070	12.530	11.830	11.670
MnO	0.196	0.167	0.180	0.188	0.184	0.184	0.149	0.148
MgO	5.410	6.530	6.410	6.360	6.370	6.500	5.420	5.920
CaO	10.750	10.070	10.720	11.490	11.340	10.660	9.630	8.950
Na <sub>2</sub> O	3.660	3.520	3.590	3.310	3.200	3.290	4.470	4.770
K <sub>2</sub> O	0.054	0.344	0.101	0.084	0.205	0.216	0.061	0.252
P <sub>2</sub> O <sub>5</sub>	0.230	0.172	0.174	0.177	0.176	0.171	0.241	0.193
L.O.I.	3.14	2.80	3.35	2.51	3.01	2.76	3.46	3.52
Sum	95.660	95.950	95.590	96.820	95.220	96.540	96.030	96.160
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.412	0.247	0.248	0.244	0.124	0.118	0.221	1.230
Cu	0.006	0.004	0.007	0.008	0.004	0.005	0.004	0.014
Zn	0.011	0.009	0.009	0.008	0.008	0.009	0.009	0.008
Pb								
Ag								
Ba	0.000	0.004	0.003	0.001	0.004	0.005	0.003	0.004
V	0.039	0.034	0.033	0.033	0.034	0.034	0.034	0.030
Cr	0.011	0.024	0.025	0.024	0.025	0.026	0.025	0.020
Co								
Ni	0.007	0.007	0.008	0.007	0.007	0.008	0.009	0.008
Sr	0.022	0.015	0.016	0.018	0.018	0.018	0.019	0.018
Zr	0.019	0.015	0.015	0.015	0.015	0.015	0.019	0.015

Rock T.	249 G <sub>1</sub> (A <sub>ferro</sub> )	250 G <sub>1</sub> (B <sub>1hyb</sub> )	251 G <sub>3</sub> (D)	252 G <sub>3</sub> (D)	253 G <sub>1</sub> (C <sub>2</sub> =B <sub>4</sub> ?)	254 G <sub>3</sub> (C <sub>2</sub> )	255 G <sub>3</sub> (C <sub>2</sub> )	256 G <sub>1</sub> (B <sub>2</sub> alt?)
Sample	D32-24	D32-25	RØ-85-1	RØ-85-2	RØ-85-3	RØ-85-4	D61-1	D61-2
Loc. No.	(230-240m)	(240-250m)	Røyrvik village road junction				(4.15-10m)	(10-20m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.640	47.500	46.270	42.580	42.060	43.100	44.950	46.860
TiO <sub>2</sub>	1.870	1.500	2.040	2.080	2.430	1.170	1.050	1.950
Al <sub>2</sub> O <sub>3</sub>	14.790	15.100	14.790	14.620	13.580	12.220	16.370	13.900
Fe <sub>2</sub> O <sub>3</sub>	13.100	11.670	10.620	10.990	12.390	8.840	9.550	13.470
MnO	0.192	0.181	0.164	0.169	0.199	0.165	0.144	0.196
MgO	7.070	6.770	7.580	7.030	5.840	5.340	9.590	6.490
CaO	9.850	9.860	10.020	11.750	10.010	13.480	10.970	10.460
Na <sub>2</sub> O	3.420	3.610	3.030	3.140	1.600	2.960	1.210	3.460
K <sub>2</sub> O	0.072	0.186	0.576	0.123	1.440	0.521	1.230	0.070
P <sub>2</sub> O <sub>5</sub>	0.210	0.148	0.350	0.372	0.352	0.128	0.071	0.193
L.O.I.	3.05	2.53	3.23	5.00	7.59	10.86	3.69	3.17
Sum	96.620	96.930	95.750	93.180	90.880	88.540	95.310	97.330
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.430	0.409	0.121	0.186	1.370	0.766	0.013	0.233
Cu	0.009	0.008	0.002	0.008	0.005	0.005	0.008	0.005
Zn	0.010	0.009	0.007	0.008	0.014	0.007	0.006	0.010
Pb								
Ag								
Ba	0.001	0.005	0.015	0.003	0.025	0.007	0.008	0.001
V	0.032	0.033	0.033	0.034	0.040	0.022	0.022	0.035
Cr	0.019	0.033	0.037	0.039	0.030	0.044	0.033	0.012
Co								
Ni	0.010	0.008	0.018	0.019	0.013	0.026	0.019	0.007
Sr	0.019	0.019	0.025	0.035	0.023	0.031	0.014	0.019
Zr	0.019	0.014	0.018	0.019	0.021	0.010	0.008	0.016

Rock T.	257 G <sub>1</sub> (B <sub>1</sub> ferro)	258 G <sub>1</sub> (B <sub>1</sub> )	259 G <sub>1</sub> (B <sub>1</sub> )	260 G <sub>1</sub> (B <sub>2</sub> -B <sub>2</sub> ?)	261 G <sub>1</sub> (B <sub>2</sub> )	262 G <sub>1</sub> (B <sub>1</sub> ferro)	263 G <sub>1</sub> (A <sub>act</sub> -B <sub>2</sub> )	264 G <sub>1</sub> (B <sub>2</sub> -B <sub>1</sub> fe)
Sample	D61-3	D61-4	D61-5	D61-6	D61-7	D61-8	D61-9	D61-10
Loc.No.	(20-30m)	(30-40m)	(40-50m)	(50-60m)	(60-70m)	(70-80m)	(80-90m)	(90-100m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.540	46.760	46.020	46.420	47.380	47.120	46.930	46.350
TiO <sub>2</sub>	1.850	1.530	1.760	1.850	1.890	1.990	2.280	2.140
Al <sub>2</sub> O <sub>3</sub>	13.510	13.880	14.650	14.300	14.090	14.090	14.790	14.870
Fe <sub>2</sub> O <sub>3</sub>	12.260	11.280	12.460	11.880	11.270	12.230	12.700	12.210
MnO	0.177	0.174	0.174	0.171	0.159	0.176	0.172	0.162
MgO	6.800	6.510	6.390	5.940	4.870	6.040	5.700	5.190
CaO	10.360	11.590	10.660	10.980	9.850	10.140	9.320	10.220
Na <sub>2</sub> O	3.260	3.420	3.250	3.650	4.780	3.510	3.950	4.150
K <sub>2</sub> O	0.178	0.260	0.205	0.121	0.052	0.240	0.227	0.052
P <sub>2</sub> O <sub>5</sub>	0.171	0.153	0.177	0.182	0.243	0.217	0.285	0.254
L.O.I.	3.06	3.68	3.35	3.51	4.24	2.80	2.56	3.57
Sum	95.430	95.800	96.090	95.860	94.920	95.990	96.750	96.000
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.284	0.190	0.347	0.333	0.296	0.136	0.357	0.334
Cu	0.010	0.005	0.008	0.008	0.003	0.004	0.004	0.006
Zn	0.009	0.008	0.009	0.008	0.010	0.009	0.011	0.010
Pb								
Ag								
Ba	0.004	0.003	0.004	0.003	0.002	0.002	0.001	0.002
V	0.033	0.031	0.034	0.036	0.033	0.035	0.038	0.037
Cr	0.025	0.019	0.018	0.024	0.023	0.026	0.028	0.026
Co								
Ni	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009
Sr	0.016	0.014	0.015	0.020	0.015	0.020	0.021	0.024
Zr	0.015	0.012	0.014	0.015	0.018	0.019	0.021	0.021

Rock T.	265 G <sub>1</sub> (B <sub>2</sub> ?)	266 G <sub>1</sub> (B <sub>1</sub> )	267 G <sub>1</sub> (B <sub>1</sub> +A)	268 G <sub>1</sub> (B <sub>2</sub> )	269 G <sub>1</sub> (B <sub>1</sub> act)	270 G <sub>1</sub> (B <sub>2</sub> )	271 G <sub>1</sub> (B <sub>1</sub> hybr)	272 G <sub>5</sub> (B <sub>6</sub> f)
Sample	D61-11	D61-12	D61-13	D61-14	D61-15	D61-16	D61-17	D61-18
Loc.No.	(100-110m)	(110-120m)	(120-130m)	(130-140m)	(140-150m)	(150-165m)	(165-170m)	(173.7-179.2m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.090	45.790	47.380	47.650	47.140	48.350	48.320	39.110
TiO <sub>2</sub>	1.800	1.570	1.950	1.890	1.580	1.490	1.540	1.500
Al <sub>2</sub> O <sub>3</sub>	15.390	14.450	14.800	15.730	15.560	15.400	13.440	17.460
Fe <sub>2</sub> O <sub>3</sub>	11.610	11.520	12.010	11.400	11.650	11.190	10.460	12.790
MnO	0.158	0.172	0.165	0.154	0.158	0.156	0.158	0.160
MgO	6.190	6.510	5.760	5.810	7.600	7.650	8.830	15.180
CaO	9.870	11.780	9.960	9.310	8.590	7.140	9.980	2.910
Na <sub>2</sub> O	3.700	2.850	3.720	4.190	3.390	4.440	2.950	2.040
K <sub>2</sub> O	0.307	0.319	0.217	0.118	0.600	0.575	0.335	0.662
P <sub>2</sub> O <sub>5</sub>	0.224	0.158	0.239	0.223	0.161	0.133	0.139	0.157
L.O.I.	3.49	3.22	2.69	2.95	3.24	3.57	2.85	6.61
Sum	95.730	95.390	96.490	96.880	97.040	97.360	96.480	92.210
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.402	0.184	0.173	0.398	0.786	1.240	0.252	0.097
Cu	0.006	0.005	0.004	0.003	0.008	0.014	0.005	0.001
Zn	0.009	0.008	0.009	0.010	0.009	0.012	0.007	0.048
Pb								
Ag								
Ba	0.004	0.005	0.005	0.002	0.004	0.004	0.003	0.004
V	0.034	0.030	0.033	0.035	0.030	0.031	0.027	0.031
Cr	0.027	0.024	0.026	0.027	0.035	0.026	0.033	0.030
Co								
Ni	0.008	0.009	0.007	0.008	0.009	0.009	0.015	0.014
Sr	0.021	0.016	0.019	0.022	0.016	0.011	0.019	0.002
Zr	0.018	0.013	0.019	0.018	0.013	0.012	0.012	0.013

	273	274	275	276	277	278	279	280
Rock T.	G <sub>1</sub> (B <sub>2</sub> )	G <sub>3</sub> (C <sub>2</sub> )	G <sub>3</sub> (C <sub>2</sub> )	G <sub>4</sub> (B <sub>4</sub> +B <sub>2</sub> ?)	G <sub>3</sub> (C <sub>1</sub> )	G <sub>3</sub> (C <sub>2</sub> ?)	G <sub>3</sub> (C <sub>2</sub> ?)	G <sub>3</sub> (C <sub>2</sub> ?)
Sample	D61-19	D61-20	D61-21	D61-22	D61-23	D61-24	D61-25	D61-26
Loc.No.	(179.2-182m)	(182-190m)	(195-200m)	(201-215 m)	(220-230m)	(230-240m)	(240-250m)	(250-260m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	48.380	48.050	43.680	48.910	47.660	44.130	44.010	45.620
TiO <sub>2</sub>	1.810	1.140	1.490	1.590	1.090	1.580	1.720	1.520
Al <sub>2</sub> O <sub>3</sub>	13.820	15.450	16.330	15.120	15.710	14.280	14.920	15.110
Fe <sub>2</sub> O <sub>3</sub>	12.430	9.790	10.390	11.250	9.230	11.450	11.890	11.490
MnO	0.138	0.128	0.131	0.123	0.141	0.174	0.170	0.167
MgO	6.950	7.880	6.310	7.880	6.360	6.070	5.500	5.740
CaO	7.910	9.030	8.840	5.400	11.630	12.960	13.360	12.610
Na <sub>2</sub> O	4.420	2.660	4.140	4.000	3.120	2.590	2.620	2.880
K <sub>2</sub> O	0.095	1.350	0.664	1.520	0.739	0.220	0.151	0.151
P <sub>2</sub> O <sub>5</sub>	0.198	0.086	0.128	0.141	0.087	0.157	0.175	0.141
L.O.I.	2.76	2.84	6.90	4.59	3.36	5.07	4.54	3.76
Sum	97.660	95.830	92.620	97.310	95.940	93.890	94.820	95.680
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	2.480	0.108	0.627	2.230	0.028	0.227	0.255	0.135
Cu	0.018	0.004	0.010	0.019	0.002	0.004	0.006	0.004
Zn	0.014	0.006	0.009	0.019	0.006	0.008	0.008	0.008
Pb								
Ag								
Ba	0.004	0.007	0.008	0.010	0.007	0.005	0.002	0.002
V	0.033	0.023	0.029	0.031	0.023	0.029	0.031	0.030
Cr	0.024	0.055	0.029	0.032	0.032	0.022	0.022	0.025
Co								
Ni	0.007	0.016	0.018	0.009	0.011	0.011	0.012	0.011
Sr	0.012	0.014	0.011	0.004	0.013	0.017	0.017	0.018
Zr	0.015	0.008	0.010	0.012	0.008	0.013	0.015	0.012

	281	282	283	284	285	286	287	288
Rock T.	G <sub>1</sub> (Aferro)	G <sub>1</sub> (B <sub>1</sub> )	G <sub>5</sub> (B <sub>4</sub> b)	G <sub>1</sub> (B <sub>2</sub> )	G <sub>4</sub>	G <sub>4</sub>	G <sub>1</sub> (B <sub>3</sub> )	G <sub>1</sub> (B <sub>2</sub> -B <sub>4</sub> ?)
Sample	D61-27	D61-28	D61-29	D61-30	OK-5	OK-1.B	387/F2.B	D63-20A
Loc.No.	(260-270m)	(270-281m)	(281-286.2m)	(287-288.4m)	Orklumpen			(272-280m?)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	42.720	45.730	44.600	46.300	61.600	55.030	43.360	48.270
TiO <sub>2</sub>	1.960	1.450	1.200	2.190	0.853	2.230	2.060	1.450
Al <sub>2</sub> O <sub>3</sub>	15.210	15.150	16.630	14.410	15.850	16.490	14.750	13.740
Fe <sub>2</sub> O <sub>3</sub>	13.720	11.670	10.840	12.180	8.990	11.600	14.170	10.470
MnO	0.182	0.158	0.137	0.132	0.720	0.171	0.140	0.148
MgO	7.220	7.830	9.560	4.950	2.570	2.730	7.730	5.110
CaO	10.720	9.510	4.980	7.950	0.978	2.650	7.070	10.200
Na <sub>2</sub> O	2.340	2.780	3.000	4.410	0.581	5.830	4.400	4.380
K <sub>2</sub> O	0.016	0.088	0.494	0.316	4.370	0.576	0.026	0.995
P <sub>2</sub> O <sub>5</sub>	0.202	0.137	0.135	0.355	0.141	0.404	0.195	0.143
L.O.I.	3.60	3.76	7.09	6.68	3.20	3.02	4.26	3.50
Sum	94.650	94.800	91.990	94.600	97.090	98.430	94.990	95.880
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.316	0.236	0.408	2.270	0.496	0.983	1.720	1.480
Cu	0.009	0.003	0.007	0.013	0.008	0.003	0.017	0.008
Zn	0.010	0.009	0.019	0.009	0.010	0.012	0.017	0.009
Pb								
Ag								
Ba	0.001	0.003	0.009	0.009	0.067	0.011	0.003	0.023
V	0.039	0.028	0.027	0.040	0.013	0.027	0.037	0.027
Cr	0.024	0.026	0.048	0.013	0.009	0.032	0.011	0.026
Co								
Ni	0.011	0.013	0.020	0.005	0.006	0.016	0.007	0.007
Sr	0.021	0.016	0.011	0.015	0.004	0.015	0.013	0.011
Zr	0.016	0.012	0.010	0.024	0.017	0.020	0.016	0.012

Rock T.	289 G <sub>1</sub> (A?)	290 G <sub>1</sub> (A <sub>hybc</sub> )	291 G <sub>2</sub> (G-A?)	292 G <sub>2</sub> (G-B?)	293 G <sub>2</sub> (C <sub>1</sub> ?)	294 G <sub>1</sub> (A)	295 G <sub>1</sub> (A)	296 G <sub>1</sub> (A)
Sample	D65-1	D65-2	D65-3	D65-4	D65-5	D65-6	D65-7	D65-8
Loc. No.	(3-10m)	(10-20m)	(20-30m)	(30-40m)	(40-50m)	(50-60m)	(60-70m)	(75-87.7m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.050	46.110	45.600	45.050	44.750	46.600	46.170	44.960
TiO <sub>2</sub>	1.880	1.400	1.500	1.580	1.620	1.860	1.750	1.960
Al <sub>2</sub> O <sub>3</sub>	14.360	15.680	14.990	15.310	15.470	14.300	14.710	13.830
Fe <sub>2</sub> O <sub>3</sub>	12.450	10.870	11.290	10.640	11.180	12.230	11.920	14.430
MnO	0.165	0.161	0.164	0.155	0.155	0.181	0.173	0.209
MgO	6.070	6.670	6.890	6.750	6.110	6.360	5.740	7.440
CaO	9.010	9.640	11.220	12.060	11.650	11.090	12.140	10.130
Na <sub>2</sub> O	4.240	3.430	2.930	2.920	2.990	3.330	3.360	2.740
K <sub>2</sub> O	0.252	0.930	0.390	0.432	0.217	0.030	0.044	0.024
P <sub>2</sub> O <sub>5</sub>	0.226	0.131	0.151	0.155	0.158	0.194	0.167	0.178
L.O.I.	3.48	3.64	3.01	3.64	3.59	2.11	2.59	2.52
Sum	95.210	95.410	95.480	95.360	94.630	96.500	96.610	96.280
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.661	0.392	0.319	0.185	0.261	0.276	0.536	0.374
Cu	0.006	0.005	0.007	0.007	0.008	0.004	0.007	0.008
Zn	0.010	0.010	0.008	0.007	0.008	0.009	0.009	0.010
Pb								
Ag								
Ba	0.004	0.010	0.004	0.006	0.004	0.004	0.001	0.002
V	0.035	0.029	0.027	0.027	0.029	0.033	0.031	0.037
Cr	0.012	0.029	0.033	0.035	0.026	0.017	0.020	0.013
Co								
Ni	0.007	0.013	0.014	0.016	0.012	0.008	0.010	0.007
Sr	0.012	0.015	0.019	0.024	0.026	0.018	0.021	0.019
Zr	0.015	0.011	0.013	0.015	0.015	0.017	0.016	0.015

Rock T.	297 G <sub>5</sub> (A <sub>ad</sub> =B <sub>af</sub> ?)	298 G <sub>3</sub> (C <sub>1</sub> , B <sub>1</sub> , B <sub>2</sub> ?)	299 G <sub>1</sub> (B <sub>4</sub> )	300 G <sub>1</sub> (B <sub>1</sub> ?)	301 G <sub>4</sub> (B <sub>4</sub> )	302 G <sub>3</sub> (C <sub>1</sub> )	303 G <sub>3</sub> (C <sub>1</sub> )	304 G <sub>3</sub> (C <sub>1</sub> )
Sample	D65-9	D65-10	D65-11	D65-12	D65-13	D65-14	D63-1	D63-2
Loc. No.	(87.75-91m)	(93-100m)	(100-108m)	(108-115m)	(115-128m)	(128-134m)	(0-10m)	(10-20m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	30.650	48.760	47.930	49.440	51.050	44.840	44.980	46.050
TiO <sub>2</sub>	2.260	1.450	1.470	1.620	1.370	1.120	0.998	1.260
Al <sub>2</sub> O <sub>3</sub>	15.800	14.240	16.860	15.470	18.280	15.820	16.940	15.360
Fe <sub>2</sub> O <sub>3</sub>	16.300	9.450	9.750	10.580	8.920	9.340	9.460	10.210
MnO	0.246	0.135	0.118	0.124	0.074	0.129	0.139	0.140
MgO	17.920	8.350	6.740	6.310	6.970	8.440	9.260	6.930
CaO	5.290	8.920	7.440	8.360	2.800	10.710	10.000	10.560
Na <sub>2</sub> O	0.237	3.010	3.710	4.550	3.990	2.790	1.790	3.280
K <sub>2</sub> O	0.141	1.110	1.420	0.127	1.980	0.081	0.987	0.301
P <sub>2</sub> O <sub>5</sub>	0.222	0.150	0.134	0.165	0.148	0.100	0.069	0.106
L.O.I.	8.67	2.92	2.88	2.46	5.01	4.12	3.55	3.47
Sum	89.240	96.010	96.170	97.200	97.100	93.840	94.830	94.490
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.004	0.373	0.724	0.532	2.510	0.524	0.080	0.251
Cu	0.000	0.048	0.010	0.006	0.004	0.008	0.008	0.006
Zn	0.013	0.007	0.008	0.008	0.021	0.007	0.006	0.007
Pb								
Ag								
Ba	0.005	0.010	0.010	0.001	0.009	0.000	0.009	0.003
V	0.033	0.032	0.030	0.031	0.029	0.022	0.021	0.025
Cr	0.025	0.027	0.038	0.026	0.026	0.041	0.034	0.032
Co								
Ni	0.011	0.012	0.017	0.012	0.012	0.020	0.019	0.014
Sr	0.003	0.013	0.013	0.018	0.004	0.020	0.009	0.015
Zr	0.018	0.012	0.011	0.013	0.011	0.009	0.007	0.010

Rock T.	305 G <sub>3</sub> (C-B <sub>4</sub> ?)	306 G <sub>3</sub> (C <sub>1</sub> )	307 G <sub>3</sub> (C <sub>1</sub> )	308 G <sub>3</sub> (C <sub>2</sub> )	309 G <sub>2</sub> (B <sub>1</sub> )	310 G <sub>2</sub> (B <sub>1</sub> hydr.)	311 G <sub>1</sub> (B, ferro?)	312 G <sub>3</sub> (C <sub>1</sub> )
Sample	D63-3	D63-4	D63-5	D63-6	D63-7	D63-8	D63-9	D63-10
Loc. No.	(20-30m)	(30-40m)	(40-50m)	(50-60m)	(180-190m)	(170-180m)	(160-170m)	(150-160m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.430	47.390	48.100	46.980	46.770	45.640	45.800	46.070
TiO <sub>2</sub>	1.210	1.300	0.966	1.080	1.670	1.620	1.790	1.200
Al <sub>2</sub> O <sub>3</sub>	15.410	15.450	13.950	15.690	14.490	14.650	14.740	14.720
Fe <sub>2</sub> O <sub>3</sub>	10.530	10.320	10.120	9.110	11.880	11.430	11.420	10.220
MnO	0.162	0.158	0.152	0.128	0.162	0.163	0.157	0.155
MgO	7.830	7.220	6.580	7.600	5.460	5.750	5.310	6.420
CaO	10.990	11.330	12.210	10.580	10.750	12.280	11.420	12.380
Na <sub>2</sub> O	2.410	2.860	3.250	2.770	3.480	3.260	3.890	2.890
K <sub>2</sub> O	0.674	0.277	0.043	0.971	0.035	0.206	0.211	0.306
P <sub>2</sub> O <sub>5</sub>	0.114	0.124	0.058	0.084	0.170	0.163	0.165	0.100
L.O.I.	2.83	2.56	2.93	3.62	2.08	3.21	4.05	3.43
Sum	96.010	96.670	95.640	95.220	95.160	95.530	95.170	94.690
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.154	0.149	0.079	0.102	0.220	0.309	0.174	0.161
Cu	0.008	0.015	0.004	0.006	0.005	0.006	0.005	0.007
Zn	0.007	0.006	0.006	0.006	0.009	0.008	0.009	0.006
Pb								
Ag								
Ba	0.004	0.003	0.000	0.006	0.003	0.001	0.002	0.004
V	0.024	0.024	0.022	0.021	0.031	0.031	0.033	0.026
Cr	0.027	0.027	0.036	0.040	0.024	0.036	0.029	0.028
Co								
Ni	0.015	0.011	0.010	0.017	0.011	0.016	0.012	0.009
Sr	0.014	0.013	0.015	0.011	0.015	0.020	0.016	0.016
Zr	0.010	0.011	0.007	0.009	0.013	0.013	0.013	0.009

Rock T.	313 G <sub>3</sub> (C <sub>1</sub> )	314 G <sub>3</sub> (C <sub>1</sub> )	315 G <sub>1</sub> (A ferro)	316 G <sub>1</sub> (A ferro)	317 G <sub>4</sub> (B <sub>4</sub> )	318 G <sub>1</sub> (B <sub>2</sub> )	319 G <sub>1</sub> (B <sub>1</sub> -B <sub>2</sub> ?)	320 G <sub>1</sub> (A)
Sample	D63-11	D63-12	D63-13	D63-14	D63-15	D63-16	D63-17	D63-18
Loc. No.	(140-150m)	(130-140m)	(190-200m)	(200-210m)	(220-230m)	(230-240m)	(240-254m)	(254-261m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.280	46.820	46.980	46.410	49.180	48.110	46.990	45.520
TiO <sub>2</sub>	1.130	0.951	2.370	2.140	1.680	1.720	1.550	1.900
Al <sub>2</sub> O <sub>3</sub>	15.230	16.030	13.470	14.430	17.110	16.210	15.350	14.430
Fe <sub>2</sub> O <sub>3</sub>	9.490	8.820	13.520	13.000	9.880	11.210	10.740	12.910
MnO	0.141	0.129	0.179	0.167	0.150	0.171	0.165	0.192
MgO	6.400	7.050	5.850	6.730	6.900	5.560	5.870	6.130
CaO	12.490	11.890	8.480	8.240	5.360	9.470	10.570	11.220
Na <sub>2</sub> O	2.790	2.490	4.100	3.740	3.910	4.100	3.440	2.980
K <sub>2</sub> O	0.308	0.692	0.205	0.741	1.840	0.225	0.381	0.035
P <sub>2</sub> O <sub>5</sub>	0.090	0.073	0.233	0.214	0.187	0.203	0.159	0.181
L.O.I.	3.38	3.01	3.93	3.18	3.23	2.43	3.06	2.44
Sum	94.560	95.160	95.900	96.210	96.920	97.640	95.520	95.770
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.092	0.106	0.636	0.427	0.996	0.878	0.245	0.179
Cu	0.010	0.006	0.006	0.007	0.006	0.007	0.003	0.006
Zn	0.006	0.005	0.010	0.011	0.010	0.008	0.008	0.009
Pb								
Ag								
Ba	0.003	0.005	0.005	0.009	0.013	0.004	0.009	0.004
V	0.026	0.021	0.041	0.039	0.033	0.032	0.030	0.036
Cr	0.029	0.032	0.010	0.013	0.027	0.026	0.027	0.027
Co								
Ni	0.010	0.011	0.007	0.008	0.009	0.010	0.009	0.008
Sr	0.017	0.014	0.013	0.017	0.008	0.017	0.014	0.020
Zr	0.008	0.007	0.019	0.018	0.015	0.017	0.013	0.015

Rock T.	321 G <sub>1</sub> (A <sub>3abr</sub> )	322 G <sub>3</sub> (B <sub>2</sub> ?)	323 G <sub>3</sub> (C <sub>1</sub> )	324 G <sub>3</sub> (C <sub>2</sub> )	325 G <sub>3</sub> (C <sub>2</sub> )	326 G <sub>3</sub> (C <sub>2</sub> )	327 G <sub>3</sub> (C <sub>1</sub> )	328 G <sub>3</sub> (C <sub>1</sub> )
Sample	D63-19	D63-21	D63-22	D63-23	D63-24	D63-25	D63-26	D63-27
Loc.No.	(261-269.5m)	(280-290m)	(290-300m)	(60-70m)	(70-80m)	(80-90m)	(108-120m)	(120-125m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	46.290	46.610	44.980	44.900	45.780	45.430	46.920	48.360
TiO <sub>2</sub>	1.840	1.210	1.160	1.100	0.937	1.040	1.200	0.979
Al <sub>2</sub> O <sub>3</sub>	13.850	17.060	16.940	15.310	15.480	15.550	14.980	14.660
Fe <sub>2</sub> O <sub>3</sub>	12.170	9.070	9.220	9.370	8.720	9.230	10.510	9.560
MnO	0.184	0.118	0.136	0.134	0.116	0.135	0.151	0.132
MgO	6.400	5.400	5.960	8.030	8.280	8.650	6.390	6.710
CaO	11.080	10.120	10.200	11.530	11.270	10.880	11.490	11.220
Na <sub>2</sub> O	3.240	4.160	3.120	2.000	1.890	2.240	3.150	3.310
K <sub>2</sub> O	0.085	0.383	0.662	1.090	1.300	0.547	0.120	0.101
P <sub>2</sub> O <sub>5</sub>	0.180	0.125	0.106	0.079	0.058	0.079	0.117	0.077
L.O.I.	3.15	3.91	5.39	4.30	3.75	3.85	2.80	2.59
Sum	95.640	95.020	92.880	93.890	94.200	94.030	95.350	95.390
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.270	1.110	0.410	0.326	0.362	0.180	0.280	0.219
Cu	0.009	0.007	0.005	0.008	0.011	0.005	0.010	0.014
Zn	0.009	0.009	0.014	0.006	0.005	0.006	0.008	0.006
Pb								
Ag								
Ba	0.003	0.004	0.003	0.008	0.012	0.006	0.002	0.004
V	0.033	0.024	0.023	0.023	0.021	0.022	0.024	0.023
Cr	0.023	0.034	0.034	0.039	0.036	0.034	0.034	0.034
Co								
Ni	0.008	0.014	0.018	0.015	0.017	0.013	0.009	0.010
Sr	0.015	0.016	0.013	0.014	0.011	0.012	0.014	0.013
Zr	0.015	0.010	0.009	0.008	0.006	0.008	0.012	0.008

Rock T.	329 G <sub>3</sub> (C <sub>1</sub> ?)	330 G <sub>3</sub> (C <sub>2</sub> )	331 G <sub>3</sub> (C <sub>1</sub> ?)	332 G <sub>1</sub> (B <sub>1</sub> )	333 G <sub>3</sub> (C <sub>1</sub> )	334 G <sub>3</sub> (C <sub>1</sub> +C <sub>2</sub> )	335 G <sub>3</sub> (C-A?)	336 G <sub>1</sub> (B <sub>1</sub> +B <sub>2</sub> )
Sample	D36-1	D36-2	D36-3	D36-4	D36-5	D36-6	D36-7	D36-8
Loc.No.	(0-10m)	(10-20m)	(20-30m)	(38- )	(50-60m)	(60-67.5m)	(68-80m)	(80-90m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.220	44.120	45.270	45.410	46.530	45.780	45.370	46.110
TiO <sub>2</sub>	1.380	1.170	1.140	1.710	1.140	1.080	1.380	1.920
Al <sub>2</sub> O <sub>3</sub>	15.770	15.000	15.490	14.550	15.550	15.900	14.630	14.890
Fe <sub>2</sub> O <sub>3</sub>	10.970	10.030	9.730	12.200	10.700	9.650	10.690	12.330
MnO	0.158	0.138	0.132	0.172	0.156	0.138	0.165	0.173
MgO	6.930	7.810	8.510	6.280	7.040	7.400	7.490	5.570
CaO	11.580	12.370	10.590	10.960	11.400	12.350	11.170	10.150
Na <sub>2</sub> O	2.820	2.030	1.860	3.170	2.860	2.380	2.350	3.830
K <sub>2</sub> O	0.288	0.704	1.080	0.157	0.293	0.632	0.743	0.214
P <sub>2</sub> O <sub>5</sub>	0.133	0.087	0.097	0.191	0.109	0.090	0.106	0.172
L.O.I.	3.02	3.91	3.05	3.01	2.69	3.26	3.44	3.18
Sum	95.540	93.720	94.150	95.120	96.090	95.650	94.290	95.650
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.239	0.182	0.179	0.275	0.229	0.134	0.083	0.203
Cu	0.010	0.007	0.010	0.007	0.008	0.008	0.004	0.006
Zn	0.007	0.006	0.006	0.009	0.008	0.006	0.007	0.010
Pb								
Ag								
Ba	0.001	0.006	0.004	0.001	0.004	0.005	0.005	0.002
V	0.025	0.023	0.021	0.029	0.025	0.023	0.026	0.035
Cr	0.029	0.029	0.030	0.021	0.035	0.033	0.029	0.028
Co								
Ni	0.013	0.013	0.018	0.009	0.011	0.014	0.012	0.012
Sr	0.017	0.020	0.014	0.019	0.013	0.016	0.013	0.017
Zr	0.013	0.010	0.009	0.018	0.010	0.009	0.011	0.015

	337	338	339	340	341	342	343	344
Rock T.	G <sub>3</sub> (C-A?)	G <sub>1</sub> (A <sub>act</sub> -B)	G <sub>1</sub> (A <sub>ferro</sub> )	G <sub>1</sub> (A <sub>ferro</sub> )	G <sub>1</sub> (B <sub>1</sub> hybr)	G <sub>1</sub> (B <sub>1</sub> hyb)	G <sub>3</sub> (C-A <sub>hyb</sub> )	G <sub>3</sub> (C <sub>2</sub> -
Sample	D36-9	D36-10	D36-11	D36-12	D36-13	D36-14	D36-15	D36-16
Loc. No.	(90-100m)	(100-110m)	(110-120m)	(120-133m)	(138.65-	(150-157m)	(163.5-167.5m)	(172.6-180
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	45.270	46.170	44.800	46.810	46.820	46.130	43.780	44.510
TiO <sub>2</sub>	1.270	1.580	2.200	2.160	1.430	1.380	1.450	1.460
Al <sub>2</sub> O <sub>3</sub>	14.920	14.140	13.410	13.500	13.880	14.530	14.230	14.480
Fe <sub>2</sub> O <sub>3</sub>	11.140	11.450	14.090	14.100	11.070	11.020	11.470	11.630
MnO	0.170	0.175	0.201	0.206	0.168	0.160	0.175	0.179
MgO	6.800	6.750	6.100	6.130	7.010	6.650	8.840	7.880
CaO	11.960	11.690	10.330	9.630	10.330	10.630	10.410	10.070
Na <sub>2</sub> O	2.640	3.140	3.280	3.710	3.500	3.280	2.460	2.140
K <sub>2</sub> O	0.243	0.055	0.042	0.062	0.026	0.024	0.150	1.100
P <sub>2</sub> O <sub>5</sub>	0.132	0.166	0.231	0.227	0.143	0.137	0.175	0.131
L.O.I.	2.62	2.54	2.33	2.25	2.79	2.18	3.05	3.59
Sum	94.820	95.620	95.040	96.870	94.640	94.310	93.460	94.110
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.213	0.305	0.335	0.329	0.195	0.357	0.292	0.646
Cu	0.005	0.003	0.005	0.006	0.008	0.011	0.007	0.006
Zn	0.008	0.008	0.011	0.011	0.007	0.007	0.008	0.010
Pb								
Ag								
Ba	0.004	0.004	0.003	0.002	0.001	0.000	0.004	0.014
V	0.027	0.029	0.039	0.038	0.027	0.028	0.028	0.031
Cr	0.021	0.017	0.014	0.011	0.033	0.030	0.032	0.029
Co								
Ni	0.010	0.008	0.008	0.007	0.008	0.007	0.010	0.014
Sr	0.016	0.015	0.020	0.016	0.014	0.020	0.015	0.013
Zr	0.010	0.014	0.018	0.018	0.013	0.012	0.012	0.011

	345	346	347	348	349	350	351	352
Rock T.	G <sub>1</sub> (A)	G <sub>1</sub> (A+B <sub>ferro</sub> )	G <sub>1</sub> (A+G <sub>2</sub> ?)	G <sub>3</sub> (C <sub>2</sub> -B <sub>act</sub> ?)	G <sub>3</sub> (C <sub>2</sub> -B?)	G <sub>3</sub> (C <sub>2</sub> )	G <sub>1</sub> (B <sub>4</sub> -b)	G <sub>3</sub> (G <sub>1</sub> ?)
Sample	D36-17	D36-18	D36-19	D36-20	D36-21	D36-22	D36-23	D36-24
Loc. No.	(180-190m)	(190-200m)	(200-210m)	(210-220m)	(220-230m)	(230-240m)	(246.5-254m)	(255-261m)
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	44.980	43.680	43.740	43.140	43.710	44.660	44.500	44.060
TiO <sub>2</sub>	1.760	2.000	1.780	1.540	1.720	1.150	1.650	1.380
Al <sub>2</sub> O <sub>3</sub>	13.620	14.770	14.030	14.260	13.510	15.560	14.140	14.860
Fe <sub>2</sub> O <sub>3</sub>	12.950	13.360	12.460	11.390	11.500	9.650	10.740	11.140
MnO	0.191	0.191	0.188	0.219	0.194	0.150	0.173	0.156
MgO	7.970	7.220	6.770	7.030	6.040	8.330	6.260	7.110
CaO	9.940	10.750	10.460	11.040	12.650	10.890	9.290	9.340
Na <sub>2</sub> O	2.500	2.480	2.910	1.680	1.860	3.070	2.980	2.800
K <sub>2</sub> O	0.044	0.034	0.323	0.869	0.049	0.196	0.352	0.164
P <sub>2</sub> O <sub>5</sub>	0.150	0.169	0.166	0.150	0.182	0.111	0.204	0.125
L.O.I.	3.04	3.40	4.54	7.04	6.89	4.96	10.32	9.14
Sum	94.410	95.020	93.500	91.790	91.900	94.010	90.700	91.480
CO <sub>2</sub>								
H <sub>2</sub> O+								
H <sub>2</sub> O-								
S	0.272	0.355	0.954	0.519	0.601	0.128	0.495	0.325
Cu	0.005	0.006	0.006	0.006	0.006	0.005	0.007	0.007
Zn	0.010	0.010	0.013	0.011	0.009	0.007	0.009	0.008
Pb								
Ag								
Ba	0.002	0.005	0.007	0.017	0.002	0.006	0.007	0.004
V	0.032	0.037	0.033	0.030	0.032	0.022	0.028	0.027
Cr	0.022	0.024	0.015	0.028	0.017	0.037	0.023	0.032
Co								
Ni	0.008	0.009	0.009	0.013	0.008	0.019	0.010	0.013
Sr	0.013	0.017	0.015	0.015	0.020	0.014	0.016	0.016
Zr	0.013	0.016	0.014	0.012	0.014	0.010	0.016	0.011

Rock T.	353 93(C1)	354 93(C1)	355 91(31)
Sample	D36-25	D10-24	D10-25
Loc. No.	(261.5-275m)	(250-260m)	(260-268.90m)
Coord. X			
Y			
Z			
%			
SiO2	47.110	46.810	46.190
TiO2	1.030	1.150	1.300
Al2O3	14.980	15.960	15.700
Fe2O3	9.580	9.840	10.990
MnO	0.148	0.131	0.152
MgO	8.870	7.910	6.530
CaO	10.050	9.770	10.110
Na2O	3.120	3.150	3.730
K2O	0.146	0.446	0.020
P2O5	0.091	0.109	0.153
L.O.I.	3.57	4.11	3.46
Sum	95.320	95.600	95.170
CO2			
H2O+			
H2O-			
S	0.066	0.247	0.220
Cu	0.005	0.008	0.007
Zn	0.007	0.007	0.007
Pb			
Ag			
Ba	0.005	0.009	0.001
V	0.021	0.021	0.024
Cr	0.034	0.046	0.038
Co			
Ni	0.014	0.023	0.017
Sr	0.012	0.013	0.017
Zr	0.008	0.009	0.014

TABLE B-7: JOMA WHOLE-ROCK SILICATE ANALYSES - 1977 SERIES (J. Olsen).

Distal Greenstones and Host-Rock Lithologies (13 samples)

Geol. Inst., NTH Analyses - (23 elements XRF + AAS Techniques).

TABLE B-7: JOMA WHOLE-ROCK SILICATE ANALYSES - 1977 SERIES (J. Olsen).

Distal Greenstones and Host-Rock Lithologies (13 samples)

Geol. Inst., NTH Analyses - (23 elements XRF + AAS Techniques).

Rock type	D	D	D	D	D	D	D	D
Analys. No.								
Sample No.	JG-1-77	JG-2-77	JG-3-77	JG-4-77	JG-5-77	JG-6-77	JG-7-77	JG-8-77
Locality No.	Outer gst.	Inner gst.	Middle gst.	Outer gst. (Orklumpen)	Outer gst. (Orklumpen)	Outer gst. (Ornes)	Berghall topp silo	mine 510 nivå
Coord. X								
Y								
Z								
%								
SiO <sub>2</sub>	49.61	46.25	45.95	48.40	48.10	45.90	46.80	41.15
TiO <sub>2</sub>	2.04	2.57	1.48	2.47	2.29	2.10	1.82	1.21
Al <sub>2</sub> O <sub>3</sub>	13.80	18.32	15.43	16.26	17.25	15.86	14.33	16.89
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	10.46	11.08	11.60	10.19	8.81	10.96	9.96	11.37
MnO	0.16	0.13	0.18	0.13	0.15	0.16	0.16	0.13
MgO	8.54	7.32	8.69	5.76	7.90	8.95	8.36	6.76
CaO	9.18	4.16	10.58	8.17	7.76	9.66	11.06	11.60
Na <sub>2</sub> O	3.30	3.90	1.90	3.00	3.90	2.40	2.80	2.60
K <sub>2</sub> O	0.54	1.44	0.04	1.01	1.00	0.56	0.16	<0.01
P <sub>2</sub> O <sub>5</sub>	0.27	0.76	0.15	0.48	0.49	0.35	0.31	0.14
L.O.I.	(2.10)		(4.00)	(4.13)		(3.10)	(4.24)	
Σ	97.90	95.93	96.00	95.87	97.65	96.90	95.76	91.86

Rock type	D	D	D	D	D	D	D	D
Analys. No.								
Sample No.	JG-1-77	JG-2-77	JG-3-77	JG-4-77	JG-5-77	JG-6-77	JG-7-77	JG-8-77
Locality No.	Outer gst.	Inner gst.	Middle gst.	Outer gst. (Orklumpen)	Outer gst. (Orklumpen)	Outer gst. (Ornes)	Berghall top silo	mine 510 niv
ppm Cu <sup>x</sup>	<5	<5	<5	28	48	49	46	<5
Zn <sup>x</sup>	86	99	86	83	66	85	80	69
Pb <sup>x</sup>	<10	13	11	<10	<10	<10	11	13
Ba <sup>x</sup>	90	166	<10	188	182	208	35	<10
V <sup>x</sup>	255	209	250	285	269	260	218	233
Cr <sup>x</sup>	258	111	281	209	166	344	367	336
Co <sup>x</sup>	39	23	39	38	23	44	37	38
Ni <sup>x</sup>	116	79	91	102	54	151	144	82
Rb <sup>x</sup>	9	26	<5	16	16	8	<5	<5
Sr <sup>x</sup>	203	227	205	362	376	307	335	376
Y	35	30	32	36	28	35	31	29
Zr	160	369	92	200	178	176	146	72
Nb	12	26	<5	35	49	24	21	<5

x = AAS analyses

Rock type	B <sub>1</sub>	B <sub>1</sub>	B <sub>5</sub>	C <sub>1</sub>	C <sub>1</sub>
Analys. No.					
Sample No.	JG-9-77	JG-10-77	JG-11-77	JG-12-77	JG-13-77
Locality No.	w.open pit	w.open pit	w.open pit	E.open pit	E.open pit
	HW	HW	HW	FW	FW

Coord. X  
Y  
Z

%					
SiO <sub>2</sub>	47.80	44.76	42.50	47.95	45.11
TiO <sub>2</sub>	1.91	1.15	1.53	1.02	1.03
Al <sub>2</sub> O <sub>3</sub>	14.91	17.92	20.10	16.40	15.86
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	12.89	9.26	10.07	9.69	9.74
MnO	0.18	0.12	0.17	0.14	0.13
MgO	6.56	8.57	9.10	9.56	7.93
CaO	10.81	10.53	3.87	10.07	11.94
Na <sub>2</sub> O	2.90	1.30	2.60	2.70	2.30
K <sub>2</sub> O	0.05	1.51	1.68	0.11	0.50
P <sub>2</sub> O <sub>5</sub>	0.21	0.11	0.14	0.10	0.12
L.O.I.	(1.78)			(2.26)	(5.34)
Σ	98.22	95.23	91.76	97.74	94.66

Rock type	B <sub>1</sub>	B <sub>1</sub>	B <sub>5</sub>	C <sub>1</sub>	C <sub>1</sub>
Analys. No.					
Sample No.	JG-9-77	JG-10-77	JG-11-77	JG-12-77	JG-13-77
Locality No.	w.open pit	w.open pit	w.open pit	E.open pit	E.open pit
	HW	HW	HW	FW	FW
ppm Cu <sup>x</sup>	5	70	99	26	38
Zn <sup>x</sup>	106	62	424	84	76
Pb <sup>x</sup>	<10	<10	223	10	<10
Ba <sup>x</sup>	<10	81	61	14	36
V <sup>x</sup>	317	183	337	169	179
Cr <sup>x</sup>	210	308	411	298	282
Co <sup>x</sup>	36	23	25	29	22
Ni <sup>x</sup>	85	137	81	120	81
Rb <sup>x</sup>	<5	14	12	<5	6
Sr <sup>x</sup>	195	274	72	100	185
Y	40	26	33	27	27
Zr	131	82	88	68	69
Nb	5	<5	<5	<5	<5

x = AAS analyses

TABLE B-8: JOMA WHOLE ROCK SILICATE ANALYSES - 1974 SERIES (G. Gale)

Distal Greenstones and Host-Rock Lithologies (6 samples)

NGU Analyses - (19 elements, combined XRF + AAS + wet chemical Techniques).

TABLE B-8: JOMA WHOLE ROCK SILICATE ANALYSES - 1974 SERIES (G. Gale)

Distal Greenstones and Host-Rock Lithologies (6 samples)

NGU Analyses - (19 elements, combined XRF + AAS + wet chemical Techniques).

Rock type	D	D	D	D	B <sub>1</sub>	B <sub>1</sub>
Analys. No.	1122/335	1122/336	1122/337	71-182*	1122/343	1122/343A
Sample No.	333	334	335	3	149	150
Locality No.	Solberg	Solberg	Solberg	Orklumpen	Joma HW	Joma HW
Coord. X	Limingen	Limingen	Limingen		DDH	DDH
Y	-Tunnsjø	-Tunnsjø	-Tunnsjø			
Z						
<hr/>						
%						
SiO <sub>2</sub>	45.40	42.90	43.40	46.21	46.20	46.70
TiO <sub>2</sub>	2.14	2.12	1.92	2.00	1.70	1.64
Al <sub>2</sub> O <sub>3</sub>	15.30	15.90	14.50	15.29	15.50	14.80
Fe <sub>2</sub> O <sub>3</sub> <sup>tot</sup>	10.30	10.80	10.50	10.26	11.70	11.80
MnO	0.18	0.17	0.17	0.08	0.19	0.17
MgO	8.20	7.80	6.10	9.36	8.10	8.30
CaO	8.20	11.00	11.10	10.25	11.50	11.90
Na <sub>2</sub> O	3.22	2.86	3.43	2.68	2.48	2.18
K <sub>2</sub> O	1.59	0.98	0.69	0.62	0.46	0.44
P <sub>2</sub> O <sub>5</sub>	0.18	0.20	0.20	0.22	0.07	0.07
L.O.I.	5.76	6.58	7.49	3.85	2.79	2.79
<hr/>						
Σ	100.47	101.31	101.50	100.82	100.69	100.79
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Rock type

Analys. No.	1122/335	1122/336	1122/337	71-182	1122/343	1122/343A
Sample No.	333	334	335	3*	149	150
Locality No.	Solberg	Solberg	Solberg	Orklumpen	Joma HW	Joma HW

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ppm Cu <sup>x</sup>	0	32	22		65	96
Zn <sup>x</sup>	74	76	81		84	76
Ba <sup>x</sup>	246	70	91		6	40
V <sup>x</sup>						
Cr <sup>x</sup>	391	396	375		345	332
Co <sup>x</sup>						
Ni <sup>x</sup>	152	156	146		130	135
Rb <sup>x</sup>	16	11	4		1	1
Sr <sup>x</sup>	186	276	217		364	309
Y	24	28	22		36	25
Zr	187	199	186		143	140

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\* wet chemical analyses

x AAS analyses

APPENDIX C.

## C.1 TABLES OF JOMA ORE TYPE WHOLE ROCK SULPHIDE ANALYSES.

TABLE C-1: JOMA ORE TYPES WHOLE ROCK SULPHIDE ANALYSES - 1985 SERIES (40 samples).

Bondar-Clegg, Canada Analyses (Rep.no. 115-1509) - 35 major heavy metal and trace elements using combined Atomic Absorption (AAS), Instrumental Neutron Activation (INNA), X-ray Fluorescence (XRF) and specific wet chemical Techniques, plus specific gravity.

TABLE C-2: JOMA ORE TYPE WHOLE ROCK SULPHIDE ANALYSES - 1986 SERIES (32 samples).

Bondar-Clegg, Canada Analyses (Rep.no. 016-0359) - 29 major heavy metal and trace element analyses using combined Atomic Absorption (AAS), Instrumental Neutron Activation (INNA), X-ray Fluorescence (XRF) and specific wet chemical techniques, plus specific gravity.

TABLE C-1:

JOMA ORE TYPES WHOLE ROCK SULPHIDE ANALYSES - 1985 SERIES. (40 samples)

Bondar-Clegg, Canada Analyses (Rep.no. 115-1509) - 35 major and trace elements using combined AAS, INNA, XRF and specific wet chemical techniques, plus specific gravity.

TABLE C-1: JOMA ORE TYPES WHOLE ROCK SULPHIDE ANALYSES - 1985 SERIES. (40 samples)

Bondar-Clegg, Canada Analyses (Rep.no. 115-1509) - 35 major and trace elements using combined AAS, INNA, XRF and specific wet chemical techniques, plus specific gravity.

	1	2	3	4	5	6	7
Ore types	Ia	Ia	Ia	IIb	IIb	IIb	Ib
Sample No.	01	02	03	04	05	06	07
Locality No.	J035/84	362 vf-11	375 øf-45	Bh1638-2 (2.00 m)	375 øfs-60	388 vf s.str.11	Bh1638-5 (6.10 m)
Coord. X	95192	94891	94941	94800	94977	95178	94800
Y	31786	31408	31435		31443	31381	
Z	580	364	376.5		375.5	391	
				447 nivå			447 nivå
Sp.gr. <sup>x</sup>	3.99	4.50	4.18	4.59	4.44	4.53	4.67
% S	42.97	40.74	35.75	35.39	38.39	42.20	43.55
% Cu	0.48	1.16	0.45	3.21 <sup>x</sup>	3.61 <sup>x</sup>	5.52 <sup>x</sup>	1.48
% Zn	0.35	0.16	0.25	1.88 <sup>x</sup>	0.30 <sup>x</sup>	0.32 <sup>x</sup>	1.50
Pb	144	62	125	64	56	79	214
Ag	17.6	7.3	37.0	18.3	11.1	48.0	11.1
ppb Au*	267	200	219	150	96	422	218
ppb Hg	330	180	350	780	940	2000	1380
Cd	14.6	8.9	13.9	78.5	14.7	21.4	142.0
% Fe	32.0	33.0	34.0	40.0	41.0	39.0	36.0
Mn	60	70	190	80	65	115	32
% P	<0.01	<0.01	<0.01	0.02	0.01	0.01	0.03
% Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
V	6	7	5	6	9	5	4
Cr	15	5	23	1	6	4	2
Co	3	27	1	226	306	246	156
Ni	8	5	17	2	3	9	3
Sn	<1	2	<1	<1	<1	<1	<1
Mo	10	6	11	12	9	19	6
W*	1	<2	3	<2	<2	<2	<2
Bi	12	18	10	15	11	10	14
Sb*	11.2	3.1	5.3	2.5	3.6	13.5	5.4
Te	1.70	2.00	1.20	<0.20	<0.20	1.20	0.60

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

Sample No.	01	02	03	04	05	06	07
As*	759.0	387.0	457.0	240.0	149.0	573.0	451.0
Se*	31	110	66	77	110	110	73
Th*	<0.4	<0.6	<0.5	<0.5	<0.5	<0.6	<0.6
U*	2.6	<0.5	<0.4	<0.4	<0.4	3.6	<0.5
% Na*	<0.02	<0.02	<0.02	0.04	0.05	0.04	<0.02
Rb	<1	<1	<1	<1	2	<1	<1
Sr	4	8	5	27	9	10	3
Zr	<1	4	<1	3	2	<1	<1
Ba*	<15	<15	<15	<15	<15	<15	<15
La*	<2	<2	<2	<2	<2	<2	<2
Hf*	<1	<2	<1	<2	<2	<2	<2
Ta*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ir*	<50	<51	<50	<50	<50	<51	<53

\* INNA (Neutron Activation Analyses))

x Grong Gruber A/S Analyses



Sample No.	09	10	11	22	23	15	16	17
As*	673.0	359.0	759.0	24.0	141.0	263.0	54.5	64.7
Se*	81	98	61	34	33	160	170	140
Th*	<0.6	<0.6	<0.6	<0.3	<0.4	<0.5	<0.5	<0.4
U*	<0.4	<0.4	<0.5	<0.3	<0.3	<0.4	<0.3	<0.3
% Na*	<0.02	0.02	<0.02	0.24	0.08	0.03	0.16	0.05
Rb	2	<1	1	3	1	1	<1	1
Sr	5	3	24	17	24	6	16	4
Zr	2	<1	<1	<1	2	<1	<1	<1
Ba*	<15	<15	<15	69	<15	<15	<15	<15
La*	<2	<2	<2	<2	<2	<2	<2	<2
Hf*	<1	<1	<2	<1	<1	<1	<1	<1
Ta*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ppb Ir*	<50	<50	<51	<50	<50	<50	<50	<50

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

	18	19	20	21	24	12	13	14
Ore types	I Ib	I Ib	IVc	IVc	IIIb	IVc	IVc	I Ic
Sample No.	18	19	20	21	24	12	13	14
Locality No.	388 vfs -6	375 øfs-34	382 vf. s.st.-17	382 vf. s.st.-20	382 vf. s.st.-15	JD-39.b/84	375 øfs-14	375 øfs-14
Coord. X	95182.5	95011	95182	95168	95181.5	95199	95043	95041
Y	31381	31437	31454	31448	31457	31808	31402.5	31399
Z	387	371.5	387	384	384.5	576	366	366
Sp. gr. <sup>x</sup>	3.62	3.88	4.31	3.70	4.25	4.85	3.85	3.71
% S	24.01	32.90	39.66	31.35	33.95	29.94	30.98	25.58
% Cu	1.23	0.70	1.67 <sup>x</sup>	2.73 <sup>x</sup>	1.20 <sup>x</sup>	0.74 <sup>x</sup>	0.55 <sup>x</sup>	7.30 <sup>x</sup>
% Zn	1.40	0.78	9.60 <sup>x</sup>	4.58 <sup>x</sup>	9.76 <sup>x</sup>	1.60 <sup>x</sup>	6.88 <sup>x</sup>	1.98 <sup>x</sup>
Pb	419	68	2020	602	957	54	473	369
Ag	11.0	2.8	66.0	84.0	38.0	3.5	15.2	20.6
ppb Au*	20	64	538	293	225	44	225	210
ppb Hg	2500	3040	>5000	4000	>5000	195	>5000	>5000
Cd	61.2	29.6	396.0	211.0	470.0	10.3	252.0	80.4
% Fe	39.0	33.0	36.0	35.0	47.0	32.0	30.0	30.0
Mn	230	53	295	370	260	400	280	360
% P	0.06	0.01	0.02	0.03	0.02	<0.01	0.02	0.03
% Ti	0.12	<0.01	0.07	0.06	0.02	0.44	0.39	0.36
V	17	7	12	10	5	53	57	84
Cr	41	3	28	19	3	115	150	120
Co	69	117	54	54	4	13	21	134
Ni	56	3	9	21	42	43	53	28
Sn	<1	<1	<1	<1	<1	<1	<1	<1
Mo	21	52	4	12	8	4	28	14
W*	<2	<2	6	6	5	<2	3	<2
Bi	10	11	21	8	12	5	12	7
Sb*	0.6	2.5	8.00	3.70	1.80	3.40	11.10	5.80
Te	1.80	<0.20	5.00	1.00	3.00	0.40	0.40	0.40

Sample No.	18	19	20	21	24	12	13	14
As*	1.3	137.0	350.0	251.0	6.3	465.0	661.0	253.0
Se*	75	53	150	83	140	10	15	78
Th*	0.9	<0.4	<0.8	<0.6	<0.6	<0.5	0.6	<0.5
U*	3.8	<0.3	0.7	<0.4	<0.5	1.3	23.6	5.5
% Na*	0.62	0.03	0.13	0.27	0.04	0.43	0.12	0.10
Rb	<1	3	<1	1	<1	1	<1	<1
Sr	58	17	22	66	8	4	3	1
Zr	12	<1	2	6	<1	25	17	19
Ba*	35	36	20	179	<15	79	32	<15
La*	6	<2	<2	<2	<2	<2	<2	<2
Hf*	<1	<1	<2	3	3	<1	<2	<1
Ta*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ppb Ir*	<50	<50	<70	<55	<56	<50	<52	<50

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

	25	26	27	28	29	30	31	32
Ore types	IVc	IIa	IVa	IVa	IVa	Ic	IVb	IVb
Sample No.	25	26	27	28	29	30	31	32
Locality No.	388 vf. s.str.-10	Bh1640-2 (3.00+3.18 + 3,85 m)	JD-50/84	362 vf-10	382 vf. s.str.-18	Bh1638-7 (8.75 +9.25m)	JD-28/84	JD-44/84
Coord. X	95178		open pit	94880	95178.5		95220	95263
Y	31381		loose block	31430	31452		31756	31791
Z	389.7			364	385		c.580	c.562
Sp.gr. <sup>x</sup>	4.10	3.92	3.96	3.81	4.24	4.44	4.83	4.16
% S	35.59	34.45	34.88	35.52	39.01	41.58	35.88	38.61
% Cu	2.20 <sup>x</sup>	>2.00	0.02 <sup>x</sup>	0.49	1.73 <sup>x</sup>	0.66	0.41	0.16 <sup>x</sup>
% Zn	10.34 <sup>x</sup>	1.05	18.30 <sup>x</sup>	1.68	9.24 <sup>x</sup>	1.05	1.58	10.20 <sup>x</sup>
Pb	726	540	2365	274	1490	154	899	2550
Ag	28.6	12.5	7.0	19.9	75.0	6.4	39.5	16.5
ppb Au*	251	140	160	180	587	130	307	345
ppb Hg	>5000	1240	>5000	>5000	>5000	1300	1980	3600
Cd	491.0	121.0	877.0	210.0	449.0	95.5	101.0	157.0
% Fe	32.0	32.0	26.0	30.0	36.0	33.0	34.0	33.0
Mn	215	78	500	70	450	42	550	400
% P	0.03	0.02	0.02	0.01	0.01	<0.01	0.02	0.02
% Ti	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
V	6	5	7	5	6	5	7	6
Cr	10	2	2	33	2	7	2	1
Co	56	225	2	1	30	49	2	1
Ni	12	2	8	17	4	4	5	2
Sn	<1	<1	<1	<1	<1	<1	<1	<1
Mo	10	10	4	8	6	4	8	3
W*	<3	2	5	5	3	<2	4	<3
Bi	9	15	5	6	17	16	10	15
Sb*	2.6	2.7	13.6	13.1	8.7	5.6	13.5	20.3
Te	0.60	1.60	<0.20	<0.20	2.30	0.80	0.40	0.40

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

Sample No.	25	26	27	28	29	30	31	32
As*	156.0	365.0	830.0	695.0	714.0	341.0	1350.0	2590.0
Se*	68	120	<11	66	80	54	15	<13
Th*	<0.6	<0.6	<0.7	<0.6	<0.6	0.6	<0.6	<0.8
U*	1.4	1.5	<0.5	<0.5	<0.5	0.8	0.7	1.5
% Na*	0.24	<0.02	0.05	<0.02	0.03	<0.02	<0.02	<0.02
Rb	<1	<1	<1	1	<1	<1	<1	<1
Sr	51	16	50	<1	38	9	31	27
Zr	<1	<1	<1	<1	<1	<1	<1	1
Ba*	55	22	<15	22	<15	<15	<15	<15
La*	<2	<2	<2	<2	<2	<2	<2	<2
Hf*	<2	<2	<2	<2	<2	<1	<2	<2
Ta*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ppb Ir*	<59	<50	<63	<55	<57	<50	<54	<71

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

		33	34	35	36	37	39	40
Ore types		IId	IVb	IVa	IIa?	IVa	IVd	IVd
Sample No.		33	34	35	36	37	39	40
Locality No.		375 øfs-50	382 vfs-21	362 øf-4	362 vf-5	375 øfs-39	375 øf-37	375 øf-40
Coord.	X	94988	95170	94846	94910	94923	94917	94923
	Y	31445	31449	31440	31404	31442	31447.5	31442
	Z	374.5	385	364	364	377.5	378.5	378
Sp.gr. <sup>x</sup>		4.27	4.03	3.57	4.67	3.61	3.74	3.59
% S		38.77	34.78	28.31	47.06	30.01	30.68	27.95
% Cu		1.34	0.30	0.76	1.52	0.29 <sup>x</sup>	0.15 <sup>x</sup>	0.16 <sup>x</sup>
% Zn		1.10	1.90	1.80	0.20	5.90 <sup>x</sup>	9.72 <sup>x</sup>	1.62 <sup>x</sup>
Pb		207	706	86	109	482	564	1695
Ag		10.0	16.5	17.1	10.5	15.2	10.1	15.6
ppb Au*		180	251	130	261	100	110	140
ppb Hg		1840	2200	2600	415	1200	>5000	2600
Cd		52.6	195.0	212.0	12.7	271.0	424.0	76.6
% Fe		35.0	35.0	26.0	31.0	26.0	25.0	27.0
Mn		28	1500	650	50	395	95	78
% P		0.02	<0.01	<0.01	<0.01	0.02	0.01	0.03
% Ti		<0.01	<0.01	<0.01	<0.01	0.04	0.07	0.04
V		4	6	7	5	5	7	9
Cr		3	1	2	3	12	8	16
Co		110	17	1	87	5	7	3
Ni		5	4	11	10	16	42	37
Sn		<1	<1	<1	<1	<1	<1	<1
Mo		16	6	16	4	5	6	8
W*		<2	<2	3	<2	3	3	<2
Bi		13	9	5	22	5	3	5
Sb*		5.3	5.4	1.7	8.4	5.7	5.2	7.9
Te		0.40	0.40	2.00	3.00	<0.20	<0.20	<0.20

Sample No.	33	34	35	36	37	39	40
As*	278.0	511.0	411.0	540.0	351.0	434.0	431.0
Se*	37	20	46	120	28	13	22
Th*	<0.5	0.6	<0.5	<0.6	<0.5	0.7	<0.5
U*	<0.4	<0.4	<0.3	<0.5	<0.3	<0.5	<0.4
% Na*	0.08	0.02	<0.02	<0.02	0.02	0.06	<0.02
Rb	1	<1	<1	<1	<1	1	<1
Sr	6	69	64	2	34	2	<1
Zr	<1	<1	2	<1	<1	7	7
Ba*	<15	<15	18	<15	25	45	32
La*	<2	<2	<2	<2	<2	<2	<2
Hf*	<1	<1	<1	<1	<1	<2	<1
Ta*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
ppb Ir*	<50	<50	<50	<50	<50	120	<50

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

TABLE C-2: JOMA ORE TYPES WHOLE-ROCK SULPHIDE ANALYSES - 1986 SERIES. (32 samples)

Bondar-Clegg, Canada Analyses (Rep.no. 016-0559) - 29 major and trace elements using combined AAS, INNA, XRF and specific wet chemical techniques, plus specific gravity.

TABLE C-2: JOMA ORE TYPES WHOLE-ROCK SULPHIDE ANALYSES - 1986 SERIES. (32 samples)

Bondar-Clegg, Canada Analyses (Rep.no. 016-0559) - 29 major and trace elements using combined AAS, INNA, XRF and specific wet chemical techniques, plus specific gravity.

	41	42	43	44	45	46	47	48
Ore types	Ia(IVa?)	IVa	IIC(Ib?)	Ia	IIC	IIB	IVb	IVb
Sample No.	JOMA 86-1	JOMA 86-2	JOMA 86-3	JOMA 86-4	JOMA 86-5	JOMA 86-6	JOMA 86-7	JOMA 86-8
Locality No.	480 ØH-4	480 ØH-10	362 vfn 6	387 vf. s.str.-1	362 vfn 1	480 ØH-6	480 ØH-5	480 ØH-11
Coord. X	95199	94813	94921	95041,5	94956	95120	95195	94783
Y	31660	31756	31382	31350	31371,5	31643	31650	31746
Z	484	491	465,5	391	365	487	484	491
Sp.gr.	4.559	4.162	4.628	4.658	4.210	4.929	4.612	4.460
% S	50.20	42.26	41.21	46.94	36.65	35.15	47.89	47.60
% Cu	0.41 <sup>x</sup>	0.25 <sup>x</sup>	4.09 <sup>x</sup>	0.98 <sup>x</sup>	7.74 <sup>x</sup>	1.69 <sup>x</sup>	0.28 <sup>x</sup>	0.66 <sup>x</sup>
% Zn	1.59 <sup>x</sup>	4.37 <sup>x</sup>	0.07 <sup>x</sup>	0.07 <sup>x</sup>	0.32 <sup>x</sup>	0.02 <sup>x</sup>	0.60 <sup>x</sup>	3.12 <sup>x</sup>
Pb	236	165	62	97	106	16	126	126
Ag	35.7	14.1	11.7	4.5	25.0	3.4	6.9	9.5
ppb Au*	335	229	190	160	368	36	130	204
ppb Hg	1620	2120	575	505	2205	180	365	1515
Cd	91.5	274.1	6.2	4.6	17.6	1.9	21.4	156.4
% Fe	14.80	15.50	17.50	15.80	22.00	20.00	15.00	15.80
Mn	160	160	100	59	100	105	115	68
% P								
% Ti								
V	8	6	8	4	9	6	5	6
Cr	12	3	3	4	2	6	4	4
Co	14	<1	484	55	438	90	3	31
Ni	<2	<2	6	2	52	5	<2	3
Sn								
Mo	1	4	3	2	10	18	2	8
W*	<5	<5	<7	<5	<5	<5	<6	<5
Bi	1	5	5	10	3	6	4	9
Sb*	11.7	4.6	5.9	7.7	6.8	1.7	5.9	5.3
Te	<0.2	<0.2	2.0	1.7	1.8	1.9	0.4	1.4

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

Sample No.	JOMA 86-1	JOMA 86-2	JOMA 86-3	JOMA 86-4	JOMA 86-5	JOMA 86-6	JOMA 86-7	JOMA 86-8
As*	1200	992	220	348	203	115	594	665
Se*	<10	<8	210	110	86	59	<9	33
Th*	<0.6	<0.5	<0.5	<0.5	<0.4	<0.4	<0.5	<0.5
U*	1.5	<0.5	<0.6	<0.6	<0.5	<0.5	<0.7	0.9
% Na*	<0.04	<0.03	<0.07	<0.04	<0.06	<0.03	<0.03	<0.05
Rb								
Sr								
Zr								
Ba*	<77	<68	<76	<63	<64	<61	<67	<66
La*	<2	<2	<2	<2	<2	<2	<2	<2
Hf*	<2	<1	<1	<1	<1	<1	<1	<1
Ta*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ir*	<51	<50	<50	<50	<50	<50	<50	<50

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

blanks = not analysed.

	49	50	51	52	53	54	55	56
Ore types	IId	IVb(Id?)	IId(IVb?)	IIIa	IIIa	IVc	IVa	IVc
Sample No.	JOMA 86-9	JOMA 86-10	JOMA 86-11	JOMA 86-12	JOMA 86-13	JOMA 86-14	JOMA 86-15	JOMA 86-
Locality No.	387 øf-3	387 vf. s.str.-2	402 vf.6	362 vfn-2	Bh2027.1 (20.15-??)	Bh2027.2 (20.70-??)	416-1	362 vfn-
Coord. X	94994	95041.5	95058.5	94955			95095	94949.5
Y	31485	31350	31296	31373			31562	31373
Z	391	389	406.5	365			420	365
Sp.gr.	4.047	4.634	4.170	3.500	4.203	4.162	4.252	3.724
% S	35.97	40.14	34.79	23.23	33.99	38.31	41.57	34.95
% Cu	4.94 <sup>x</sup>	0.82 <sup>x</sup>	1.43 <sup>x</sup>	13.90 <sup>x</sup>	2.54 <sup>x</sup>	0.63 <sup>x</sup>	0.01 <sup>x</sup>	0.54 <sup>x</sup>
% Zn	1.92 <sup>x</sup>	1.85 <sup>x</sup>	0.07 <sup>x</sup>	0.53 <sup>x</sup>	0.57 <sup>x</sup>	10.30 <sup>x</sup>	20.80 <sup>x</sup>	6.28 <sup>x</sup>
Pb	104	128	31	44	81	4160	3080	281
Ag	13.5	4.9	4.1	38.0	67.0	34.0	23.0	3.7
ppb Au*	232	120	120	236	256	250	100	58
ppb Hg	4540	2725	1040	2485	460	>5000	>5000	>5000
Cd	96.8	81.5	7.1	28.0	8.2	433.5	1742.0	308.6
% Fe	19.00	17.00	21.50	14.50	24.50	18.00	15.00	18.00
Mn	47	76	270	220	60	220	250	720
% P								
% Ti								
V	5	4	8	26	10	20	14	14
Cr	3	2	2	17	2	22	2	8
Co	342	8	366	132	265	57	2	36
Ni	4	<2	13	24	53	12	6	11
Sn								
Mo	6	<1	6	7	8	6	2	8
W*	<5	<6	<4	<4	<6	<7	<9	<6
Bi	9	13	6	<1	<1	5	10	4
Sb*	5.4	6.2	1.9	0.8	1.2	15.4	7.3	3.8
Te	1.3	0.5	1.8	1.4	1.5	0.2	0.5	0.4

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

Sample No.	JOMA 86-9	JOMA 86-10	JOMA 86-11	JOMA 86-12	JOMA 86-13	JOMA 86-14	JOMA 86-15	JOMA 86-1
As*	262	228	71.7	36	54.1	538	1640	310
Se*	93	22	120	96	110	<9	<11	28
Th*	<0.4	<0.5	<0.4	<0.3	<0.4	<0.5	<0.7	<0.4
U*	2.3	1.1	<0.4	<0.4	<0.5	0.8	<0.7	1.1
% Na*	<0.06	<0.04	<0.04	0.23	<0.05	0.34	<0.05	<0.05
Rb								
Sr								
Zr								
Ba*	<57	<61	100	<50	<60	<79	<100	<65
La*	<2	<2	<2	3	<2	<2	<2	3
Hf*	<1	<1	<1	<1	<1	<1	<2	<2
Ta*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ir*	<50	<50	<50	<50	<50	<50	<64	<50

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

blank = not analysed

	57	58	59	60	61	62	63	64
Ore types	IIa	IVa(IVc?)	IVa	IVc	IIa	IVd	IVd	Va
Sample No.	JOMA 86-17	JOMA 86-18	JOMA 86-19	JOMA 86-20	JOMA 86-21 (from A.H.)	JOMA 86-22	JOMA 86-23	JOMA 86-24
Locality No.	480 ØH-14	Bh2027-3 (22,0-??)	480 ØH-2	Bh D64 (298,0m)	Bh D60 (311.81- 313,05m)	362 vfn-3	387 øf-4	Bh D52 (219,7 m)
Coord. X	94730		95296			94965	95005	
Y	31742.5		31630			31377.5	31480	
Z	491		480			367	391	
Sp.gr.	3.395	4.051	3.993	3.570	3.895	3.394	3.925	3.285
% S	24.61	35.93	37.81	29.46	38.50	36.14	34.66	17.690
% Cu	3.54 <sup>x</sup>	0.11 <sup>x</sup>	0.23 <sup>x</sup>	0.73 <sup>x</sup>	1.17 <sup>x</sup>	0.27	0.13 <sup>x</sup>	0.039
% Zn	0.12 <sup>x</sup>	7.68 <sup>x</sup>	3.41 <sup>x</sup>	0.93 <sup>x</sup>	0.12 <sup>x</sup>	1.69	16.20 <sup>x</sup>	0.018
Pb	30	1820	1010	231	300	2050	1960	8
Ag	13.5	10.2	15.8	11.4	28.0	10.8	9.9	1.7
ppb Au*	43	160	94	91	331	130	92	16
ppb Hg	1080	>5000	1730	1620	310	1730	>5000	50
Cd	65.6	336.2	181.0	49.9	5.4	84.3	981.0	1.4
% Fe	13.50	17.50	18.00	16.30	16.30	11.00	14.00	16.50
Mn	340	340	520	185	105	60	230	350
% P								
% Ti								
V	16	12	8	16	10	8	8	50
Cr	12	15	3	15	21	10	10	29
Co	43	18	<1	16	76	5	19	50
Ni	37	24	3	46	15	12	38	125
Sn								
Mo	6	10	3	1	12	4	3	18
W*	<4	<8	<5	11	<6	<4	<10	<5
Bi	<1	2	7	7	5	10	6	<1
Sb*	2.2	10.7	4.9	3.8	22.5	6.0	9.2	0.8
Te	<0.2	0.4	0.9	1.9	2.7	1.1	0.2	1.5

Sample No.	JOMA 86-17	JOMA 86-18	JOMA 86-19	JOMA 86-20	JOMA 86-21	JOMA 86-22	JOMA 86-23	JOMA 86-
As*	319	294	406	292	781	278	282	2320
Se*	41	<8	<7	76	55	<7	<9	<7
Th*	<0.3	<0.5	<0.4	<0.5	<0.6	<0.3	<0.5	3.0
U*	<0.4	1.5	<0.5	<0.6	0.9	<0.4	<0.6	15.0
% Na*	<0.04	0.25	<0.04	<0.05	<0.08	<0.04	<0.05	0.33
Rb								
Sr								
Zr								
Ba*	<50	<72	<60	<68	<76	<50	<83	<79
La*	2	<2	2	4	4	4	2	19
Hf*	<1	<1	<1	<1	<1	<1	<2	<1
Ta*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ir*	<50	<50	<50	<50	<50	<50	<52	<50

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

blanks = not analysed

	65	66	67	68	69	70	71	72
Ore types	Va	Vqtzd	Vqtzmt	Vqtzpo	Vb	Vb	Dissem 1	Dissem 1
Sample No.	JOMA 86-25	JOMA 86-26	JOMA 86-27	JOMA 86-28	JOMA 86-29	JOMA 86-30	JOMA 86-31	JOMA 86-32
Locality No.	Bh D7 (13.65m)	Bh D63 (254.30m)	402 ØLS -1	402 ØLS -1.B	Orklumpen OK-1A	Orklumpen OK-2	Orklumpen OK 1.B	Orklumpen OK-5
Coord.	X		94972	94972				
	Y		31515	31515				
	Z		400	400				
Sp.gr.	4.055	3.040	3.000	2.674	2.873	2.824	2.789	2.701
% S	31.38	10.87	1.50	5.03	0.68	2.05	1.32	0.64
% Cu	0.562	0.056	0.008	0.014	0.003	0.013	0.003	0.007
% Zn	0.003	0.002	0.006	0.002	0.013	0.008	0.011	0.009
Pb	3	25	21	9	17	23	28	29
Ag	1.7	0.6	1.4	3.3	0.1	<0.1	<0.1	0.1
ppb Au*	8	36	239	8	<4	<4	<3	<3
ppb Hg	175	25	70	45	15	30	15	10
Cd	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
% Fe	24.00	9.30	7.20	7.10	5.60	5.00	5.80	4.00
Mn	150	2100	260	210	1300	540	940	1500
% P								
% Ti								
V	10	20	8	5	90	42	90	20
Cr	2	8	4	4	150	140	187	20
Co	71	72	<1	1	20	29	31	24
Ni	60	168	3	9	68	85	126	42
Sn								
Mo	<1	<26	<1	<1	<1	<1	<1	<1
W*	<5	<3	<3	<2	<4	<4	<4	<3
Bi	3	2	2	<1	<1	1	1	<1
Sb*	0.4	0.3	0.6	0.1	0.1	0.4	0.1	0.2
Te	1.2	1.5	1.9	1.6	1.9	1.0	1.2	1.2

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

Sample No.	JOMA 86-25	JOMA 86-26	JOMA 86-27	JOMA 86-28	JOMA 86-29	JOMA 86-30	JOMA 86-31	JOMA 86-32
As*	2.7	1.7	<1.2	<0.8	<1.4	<1.3	1.4	<1.1
Se*	27	10	<5	8	<5	<5	<5	<5
Th*	<0.4	0.9	<0.2	<0.2	1.5	0.7	1.6	13.0
U*	<0.5	4.6	<0.2	<0.2	1.7	<0.2	1.5	2.3
% Na*	<0.04	0.08	<0.03	<0.02	4.03	4.78	4.21	0.57
Rb								
Sr								
Zr								
Ba*	<57	<50	<50	<50	280	150	110	670
La*	3	11	4	2	17	16	22	32
Hf*	1	<1	<1	<1	5	5	5	5
Ta*	<0.5	<0.5	<0.5	<0.5	1.3	0.7	1.6	1.2
Ir*	<50	<50	<50	<50	<50	<50	<50	<50

\* INNA (Neutron Activation Analyses)

x Grong Gruber A/S Analyses

blanks = not analysed.

APPENDIX D.

D.1 TABLES OF COMPUTER PRINT-OUT FOR STATISTICAL ANALYSES PERFORMED ON WHOLE ROCK SILICATE ANALYSES DATA (355 ANALYSES) FROM 1986 SURFACE DDH SERIES (given in Table A-6).

TABLE D-1: CLUSTER ANALYSIS

TABLE D-2: FACTOR ANALYSIS

TABLE: D-1

PAGE 1

BMDPKM - K MEANS CLUSTERING OF CASES  
 BMDP STATISTICAL SOFTWARE, INC.  
 1964 WESTWOOD BLVD. SUITE 202  
 (213) 475-5700  
 PROGRAM REVISED APRIL 1982  
 MANUAL REVISED -- 1981  
 COPYRIGHT (C) 1982 REGENTS OF UNIVERSITY OF CALIFORNIA

TO SEE REMARKS AND A SUMMARY OF NEW FEATURES FOR  
 THIS PROGRAM, STATE NEWS. IN THE PRINT PARAGRAPH.

PROGRAM CONTROL INFORMATION

/ PROBLEM TITLE IS 'NORGE'.  
 / INPUT VARIABLES ARE 19.  
 / VARIABLE NAMES ARE S102, TI02, AL203, FE203, MNO,  
 MGO, CAC, NA20, K20, P205, S, CU,  
 ZN, BA, V, CR, NI, SR, ZR.  
 / CLUSTER NUMBER=5.  
 / END

PROBLEM TITLE IS

NORGE  
 NUMBER OF VARIABLES TO READ IN. . . . . 19  
 NUMBER OF VARIABLES ADDED BY TRANSFORMATIONS. . . . . 0  
 TOTAL NUMBER OF VARIABLES . . . . . 19  
 NUMBER OF CASES TO READ IN. . . . . TO END  
 CASE LABELING VARIABLES . . . . .  
 MISSING VALUES CHECKED BEFORE OR AFTER TRANS. . . . . NEITHER  
 BLANKS ARE. . . . . MISSING  
 INPUT UNIT NUMBER . . . . . 5  
 REWIND INPUT UNIT PRIOR TO READING. . . . . NO  
 NUMBER OF WORDS OF DYNAMIC STORAGE. . . . . 79998

VARIABLES TO BE USED  
 1 S102 2 TI02 3 AL203 4 FE203 5 MNO  
 6 MGO 7 CAC 8 NA20 9 K20 10 P205  
 11 S 12 CU 13 ZN 14 BA 15 V  
 16 CR 17 NI 18 SR 19 ZR

PAGE 2 BMDPKM NORGE

INPUT FORMAT IS FREE

MAXIMUM LENGTH DATA RECORD IS 50 CHARACTERS.

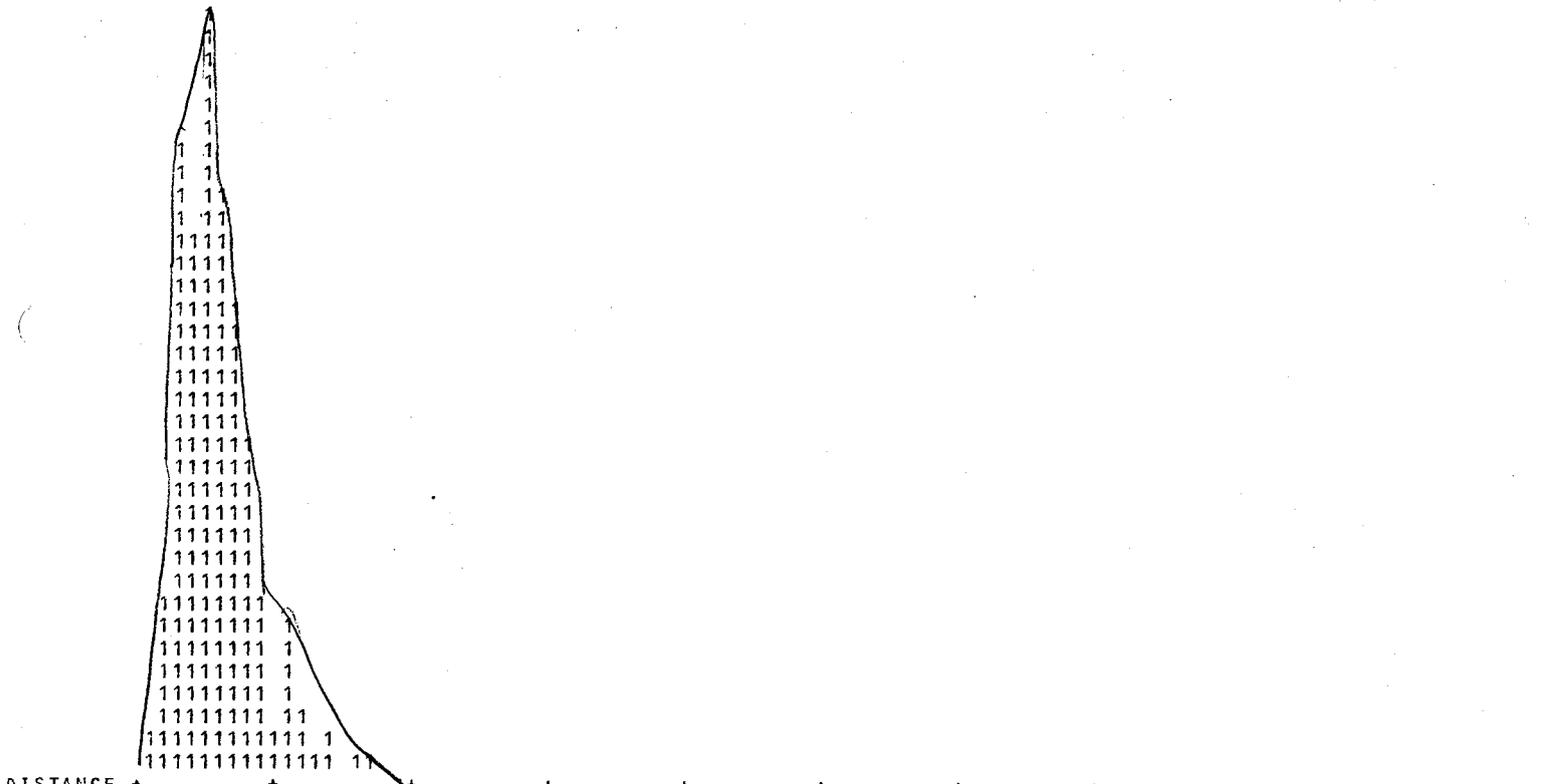
PAGE 3 BMDPKM NORGE

NUMBER(S) OF CLUSTER(S) TO REPORT . . . . . 5  
 MAXIMUM NUMBER OF MISSING VALUES PER CASE . . . . . 9  
 MAXIMUM NUMBER OF ITERATIONS. . . . . 30  
 MAXIMUM NUMBER OF CASES THAT CAN BE PROCESSED 2892  
 NUMBER OF CASES READ. . . . . 335

PAGE 4 BMDPKM NORGE

REALLOCATION IS COMPLETE AFTER 15 ITERATIONS FOR 5 CLUSTERS

CLUSTER 1 OF 5 CONTAINS 183 CASES



DISTANCE FROM CENTER TO CASES IN THIS CLUSTER 17.5000 35.0000

3  
 33  
 33  
 333  
 333  
 333  
 333  
 333  
 3333  
 3333  
 3333  
 3333  
 3 3333  
 3 3333  
 333333  
 333333  
 33333333  
 33333333  
 33333333  
 33333333  
 33333333  
 33333333  
 3333333333435  
 333333333333434

DISTANCE FROM CENTER TO CASES IN OTHER CLUSTERS 17.5000 35.0000

5 5  
 4 4 4 4 4 5 4 4 5 2 2 5 4 2 52 2

C A S E	WEIGHT	DISTANCE	I	VARIABLE	MINIMUM	CENTER	MAXIMUM	ST. DEV.
2	1.0000	2.7011	I	1 SI02	42.0680	46.2032	49.4400	1.2213
17	1.0000	1.8478	I	2 TI02	1.2500	1.7971	2.4800	.2426
18	1.0000	1.2097	I	3 AL203	12.8830	14.6563	17.4400	.8186
21	1.0000	1.1217	I	4 FE2O3	8.8700	12.0734	15.2800	1.0782
22	1.0000	1.2102	I	5 MNO	.1040	.1703	.2250	.0204
23	1.0000	2.2309	I	6 M60	3.3830	6.4027	8.8300	.7863
26	1.0000	3.6170	I	7 CAO	5.7130	10.0250	12.7100	1.1588
29	1.0000	2.5281	I	8 NA2O	1.6000	3.4950	5.5600	.5306
30	1.0000	1.8199	I	9 K2O	.0150	.2393	1.4400	.2599
33	1.0000	1.8141	I	10 P2O5	.0970	.1883	.3550	.0405
34	1.0000	.5734	I	11 S	.0580	.4723	3.3400	.4257
35	1.0000	3.1164	I	12 CU	.0020	.0071	.0390	.0046
37	1.0000	1.1899	I	13 ZN	.0070	.0099	.0600	.0047
38	1.0000	2.4856	I	14 BA	.0000	.0039	.0250	.0032
39	1.0000	2.0835	I	15 V	.0240	.0334	.0440	.0039
40	1.0000	2.0438	I	16 CR	.0080	.0221	.0380	.0065
43	1.0000	3.1930	I	17 NI	.0050	.0090	.0170	.0022
46	1.0000	1.7020	I	18 SR	.0090	.0167	.0270	.0033
50	1.0000	.8508	I	19 ZR	.0090	.0154	.0250	.0030
52	1.0000	2.3871	I					
53	1.0000	1.4345	I					
55	1.0000	2.3671	I					
56	1.0000	1.5725	I					
58	1.0000	2.8133	I					
61	1.0000	1.3783	I					
65	1.0000	1.7430	I					
66	1.0000	1.4464	I					
67	1.0000	1.8318	I					
68	1.0000	2.5314	I					
69	1.0000	2.7706	I					
70	1.0000	1.8502	I					
71	1.0000	1.0720	I					
72	1.0000	2.0477	I					
73	1.0000	2.4928	I					
85	1.0000	2.3585	I					
98	1.0000	1.1594	I					
99	1.0000	3.3053	I					
101	1.0000	2.6701	I					
102	1.0000	2.1691	I					
103	1.0000	1.5092	I					
104	1.0000	1.1749	I					
106	1.0000	1.5682	I					
107	1.0000	1.7110	I					
108	1.0000	1.0392	I					
109	1.0000	.5626	I					
110	1.0000	2.2839	I					
111	1.0000	2.2085	I					
113	1.0000	1.8514	I					
115	1.0000	2.2404	I					

$G_1 \rightarrow$  se figure

250	1.0000	I	1.5210	116	1.0000	1.8577	I	24	1.0000	2.8971	I
256	1.0000	I	1.8062	117	1.0000	2.6501	I	346	1.0000	3.2182	I
257	1.0000	I	1.3528	118	1.0000	.9544	I	347	1.0000	2.7415	I
258	1.0000	I	2.0400	119	1.0000	1.6507	I	1	1.0000	4.0027	I
259	1.0000	I	.8155	120	1.0000	1.8885	I	127	1.0000	3.0883	I
260	1.0000	I	1.1823	121	1.0000	1.8527	I	253	1.0000	5.0009	I
261	1.0000	I	2.5417	132	1.0000	3.3527	I	281	1.0000	4.2115	I
262	1.0000	I	1.2174	135	1.0000	1.4752	I	150	1.0000	1.7093	I
263	1.0000	I	1.5468	136	1.0000	1.8573	I	123	1.0000	2.0936	I
264	1.0000	I	1.4832	137	1.0000	1.6855	I	54	1.0000	2.2909	I
265	1.0000	I	.9424	139	1.0000	2.1803	I	-----			
266	1.0000	I	2.0419	140	1.0000	1.1580	I	AVERAGE DISTANCE			2.2156
267	1.0000	I	1.6119	141	1.0000	1.3047	I				
268	1.0000	I	2.2529	142	1.0000	1.3735	I				
269	1.0000	I	2.3778	143	1.0000	3.8034	I				
270	1.0000	I	4.1849	145	1.0000	1.2826	I				
271	1.0000	I	3.8575	147	1.0000	1.6326	I				
273	1.0000	I	3.9046	148	1.0000	1.7091	I				
282	1.0000	I	1.9095	151	1.0000	1.1354	I				
284	1.0000	I	3.2796	153	1.0000	1.9034	I				
288	1.0000	I	3.4463	154	1.0000	2.6481	I				
289	1.0000	I	1.4118	155	1.0000	2.1017	I				
290	1.0000	I	1.8367	164	1.0000	2.3889	I				
294	1.0000	I	1.2485	166	1.0000	1.0567	I				
295	1.0000	I	2.2368	167	1.0000	2.2681	I				
296	1.0000	I	3.0860	168	1.0000	1.1506	I				
299	1.0000	I	4.6528	169	1.0000	3.0133	I				
300	1.0000	I	4.1609	170	1.0000	1.4357	I				
309	1.0000	I	1.3867	171	1.0000	1.8390	I				
310	1.0000	I	2.5215	172	1.0000	2.2886	I				
311	1.0000	I	1.9958	177	1.0000	1.1884	I				
315	1.0000	I	2.7423	178	1.0000	.9783	I				
316	1.0000	I	2.1629	179	1.0000	1.9305	I				
318	1.0000	I	2.8897	180	1.0000	2.7381	I				
319	1.0000	I	1.8963	181	1.0000	2.6969	I				
320	1.0000	I	1.7677	182	1.0000	2.2551	I				
321	1.0000	I	1.3828	183	1.0000	2.2968	I				
322	1.0000	I	1.3057	184	1.0000	1.4038	I				
336	1.0000	I	1.0193	185	1.0000	3.0361	I				
338	1.0000	I	1.9455	186	1.0000	2.5695	I				
339	1.0000	I	2.8360	187	1.0000	4.0223	I				
340	1.0000	I	2.5051	189	1.0000	3.4524	I				
341	1.0000	I	1.6466	191	1.0000	2.0667	I				
342	1.0000	I	1.3568	192	1.0000	3.0914	I				
345	1.0000	I	2.6218	193	1.0000	.7463	I				
355	1.0000	I	1.6440	194	1.0000	1.7654	I				
25	1.0000	I	2.2847	207	1.0000	1.9057	I				
124	1.0000	I	3.1485	208	1.0000	3.8734	I				
351	1.0000	I	2.4096	224	1.0000	5.6255	I				
195	1.0000	I	4.3188	233	1.0000	1.5175	I				
126	1.0000	I	3.1576	236	1.0000	1.0908	I				
100	1.0000	I	4.2873	238	1.0000	1.5137	I				
36	1.0000	I	2.5021	239	1.0000	2.4279	I				
165	1.0000	I	2.6694	241	1.0000	2.3687	I				
240	1.0000	I	2.8497	242	1.0000	1.2299	I				
122	1.0000	I	2.5974	243	1.0000	1.2621	I				
133	1.0000	I	3.1046	244	1.0000	2.2867	I				
160	1.0000	I	3.0136	245	1.0000	1.7806	I				
234	1.0000	I	2.1569	246	1.0000	1.4939	I				
287	1.0000	I	5.0471	247	1.0000	1.9675	I				
223	1.0000	I	5.1525	248	1.0000	2.0522	I				
57	1.0000	I	3.1188	249	1.0000	1.3808	I				





CASE	WEIGHT	DISTANCE	1.0000	5.4060	1.0000	49	1.0000	3.6065	I	
254	14	2.7955	1.0000	5.4060	1.0000	49	1.0000	3.6065	I	
275	15	1.5155	1.0000	3.6028	1.0000	81	1.0000	2.1158	I	
278	16	1.7760	1.0000	3.3393	1.0000	156	1.0000	2.2281	I	
279	27	2.0824	1.0000	3.9559	1.0000	264	1.0000	1.7882	I	
330	32	1.4678	1.0000	2.0203	1.0000	213	1.0000	2.1477	I	
243	41	2.9401	1.0000	2.8599	1.0000	215	1.0000	6.3132	I	
344	45	5.1613	1.0000	2.4311	1.0000	221	1.0000	3.1297	I	
348	82	2.5116	1.0000	2.5871	1.0000	313	1.0000	2.2130	I	
349	84	3.8810	1.0000	1.5970	1.0000	314	1.0000	2.2683	I	
350	87	1.9919	1.0000	1.8007	1.0000	7	1.0000	2.3785	I	
352	94	3.4239	1.0000	1.7272	1.0000	8	1.0000	2.0367	I	
4	95	2.7200	1.0000	1.8775	1.0000	9	1.0000	1.6432	I	
3	96	2.2822	1.0000	2.6220	1.0000	19	1.0000	1.9613	I	
10	112	2.3187	1.0000	1.9118	1.0000	28	1.0000	1.9613	I	
13	128	2.3596	1.0000	2.6545	1.0000	47	1.0000	2.5564	I	
31	129	3.0279	1.0000	3.2611	1.0000	48	1.0000	2.9653	I	
42	149	3.7935	1.0000	1.0619	1.0000	51	1.0000	2.5808	I	
62	152	4.0018	1.0000	2.3332	1.0000	76	1.0000	2.9503	I	
64	161	3.1087	1.0000	1.5428	1.0000	77	1.0000	2.7202	I	
92	163	3.4143	1.0000	1.3109	1.0000	79	1.0000	3.0974	I	
93	201	2.3721	1.0000	1.6449	1.0000	125	1.0000	2.1673	I	
97	202	4.7868	1.0000	2.4834	1.0000	134	1.0000	1.6244	I	
130	203	1.0828	1.0000	1.1114	1.0000	175	1.0000	1.8496	I	
159	205	2.0174	1.0000	3.0609	1.0000	230	1.0000	1.2635	I	
162	206	2.0174	1.0000	2.1917	1.0000	291	1.0000	1.5488	I	
173	226	3.0612	1.0000	1.5326	1.0000	305	1.0000	1.1447	I	
174	232	1.1690	1.0000	.8619	1.0000	308	1.0000	1.9988	I	
188	233	3.8209	1.0000	1.4867	1.0000	312	1.0000	2.0993	I	
214	235	3.8209	1.0000	2.7847	1.0000	353	1.0000	2.5359	I	
227	252	3.4070	1.0000	1.5585	1.0000	200	1.0000	2.2594	I	
231			1.0000	2.1465	1.0000	228	1.0000	1.7039	I	
255			1.0000	1.4722	1.0000	237	1.0000	2.1652	I	
292			1.0000	2.7401	1.0000	304	1.0000	1.2819	I	
293			1.0000	1.4085	1.0000	333	1.0000	1.4691	I	
302			1.0000	1.9527	1.0000	354	1.0000	2.0651	I	
303			1.0000	1.4396	1.0000	277	1.0000	2.7765	I	
324			1.0000	1.3095	1.0000	86	1.0000	2.8588	I	
325			1.0000	1.4390	1.0000	89	1.0000	3.1896	I	
326			1.0000	1.5357	1.0000	146	1.0000	1.9763	I	
329			1.0000	1.1198	1.0000	176	1.0000	2.3063	I	
331			1.0000	1.7227	1.0000	229	1.0000	1.8310	I	
334			1.0000	2.1260	1.0000	306	1.0000	2.0744	I	
335			1.0000	2.3454	1.0000	274	1.0000	3.4503	I	
337			1.0000	1.0716	1.0000	322	1.0000	3.7416	I	
5			1.0000	1.2908	1.0000	91	1.0000	2.2718	I	
6			1.0000	1.4889	1.0000	59	1.0000	3.2463	I	
11			1.0000	1.2750	1.0000	251	1.0000	1.8470	I	
12			1.0000	1.6093	1.0000	280	1.0000	2.8872	I	
20			1.0000	2.3045	1.0000	44	1.0000	2.0766	I	
60			1.0000	2.4147	1.0000	190	1.0000	3.3798	I	
63			1.0000	2.2253	1.0000	328	1.0000	3.3555	I	
63			1.0000	1.2078	1.0000	327	1.0000	2.1997	I	
78			1.0000	1.8055	1.0000	298	1.0000	4.3363	I	
80			1.0000	.6648	1.0000	307	1.0000	3.5666	I	
83			1.0000	2.2292	1.0000					
88			1.0000	1.3104	1.0000					
90			1.0000	1.5328	1.0000					
131			1.0000	2.6270	1.0000					
144			1.0000		1.0000					
157			1.0000		1.0000					
158			1.0000		1.0000					
323			1.0000		1.0000					

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AVERAGE DISTANCE  
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CASE	WEIGHT	DISTANCE	I
14	1.0000	2.7955	I
15	1.0000	1.5155	I
16	1.0000	1.7760	I
27	1.0000	2.0824	I
32	1.0000	1.4678	I
41	1.0000	2.9401	I
45	1.0000	5.1613	I
82	1.0000	2.5116	I
84	1.0000	3.8810	I
87	1.0000	1.9919	I
94	1.0000	3.4239	I
95	1.0000	2.7200	I
96	1.0000	2.2822	I
112	1.0000	2.3187	I
128	1.0000	2.3596	I
129	1.0000	3.0279	I
149	1.0000	3.7935	I
152	1.0000	4.0018	I
161	1.0000	3.1087	I
163	1.0000	3.4143	I
201	1.0000	2.3721	I
202	1.0000	4.7868	I
203	1.0000	1.0828	I
205	1.0000	2.0174	I
226	1.0000	3.0612	I
232	1.0000	1.1690	I
235	1.0000	3.8209	I
252	1.0000	3.4070	I

VARIABLE	MINIMUM	CENTER	MAXIMUM	ST.DEV.
1 SIO2	41.4800	45.4185	48.7600	1.2894
2 TI02	.6530	1.2381	2.0800	.2320
3 AL2O3	12.2200	15.4878	18.8200	.8588
4 FE2O3	8.5500	10.1276	13.3100	.8568
5 MNO	.0910	.1467	.2190	.0174
6 MGO	4.9600	7.6343	10.0700	1.2019
7 CAO	6.6600	11.0594	14.2800	1.1546
8 NA2O	1.1600	2.6333	4.1900	.5606
9 K2O	.0170	.5400	1.8600	.4166
10 P2O5	.0310	.1110	.3720	.0442
11 S	.0130	.2397	1.5000	.2097
12 CU	.0020	.0077	.0480	.0044
13 ZN	.0030	.0073	.0230	.0022
14 BA	.0000	.0054	.0190	.0033
15 V	.0180	.0248	.0340	.0035
16 CR	.0170	.0320	.0560	.0062
17 NI	.0080	.0150	.0260	.0044
18 SR	.0380	.0154	.0350	.0041
19 ZR	.0030	.0100	.0190	.0025







CLUSTER MEANS

	SI02 ZN	TI02 BA	AL203 V	FE203 CR	MNO NI	MGO SR	CAO ZR	MA20	K20	P205	S	CU
1	45.2032	1.7971	14.6563	12.0734	-1.703	6.4027	10.0250	3.4950	.2393	.1883	.4723	.0071
	.0099	.0039	.0334	.0221	.0090	.0167	.0154					
2	34.6520	1.3554	17.1120	25.6680	-1.782	9.4820	1.3768	1.8862	.3078	.1084	1.6204	.0580
	.0402	.0052	.0296	.0342	.0102	.0016	.0096					
3	45.4185	1.2381	15.4878	10.1276	-1.467	7.6343	11.0594	2.6333	.5400	.1110	.2397	.0077
	.0073	.0054	.0248	.0320	.0150	.0154	.0100					
4	50.0947	1.4429	16.4960	11.1720	-1.929	6.8413	3.5305	3.4941	1.7817	.1511	2.0778	.0247
	.0444	.0147	.0283	.0267	.0106	.0049	.0118					
5	40.1613	1.6725	16.7550	13.5125	-1.770	12.7425	3.7875	2.1186	.9169	.1626	1.2943	.0138
	.1021	.0070	.0321	.0301	.0132	.0040	.0132					
GRAND MEAN	45.7505	1.5463	15.1532	11.4699	-1.619	7.1071	9.9078	3.0918	.4427	.1537	.4805	.0089
	.0128	.0050	.0296	.0267	.0116	.0152	.0129					

CLUSTER STANDARD DEVIATIONS

	SI02 ZN	TI02 BA	AL203 V	FE203 CR	MNO NI	MGO SR	CAO ZR	MA20	K20	P205	S	CU
1	1.2213	.2426	.8186	1.0782	.0204	.7863	1.1588	.5306	.2599	.0405	.4257	.0046
	.0047	.0032	.0039	.0065	.0022	.0033	.0030					
2	4.4640	.4250	.7295	4.6834	.0318	1.6720	.5432	.9354	.5737	.0319	2.1714	.0676
	.0220	.0033	.0062	.0040	.0013	.0005	.0038					
3	1.2894	.2320	.8588	.8568	.0174	1.2019	1.1546	.5606	.4166	.0442	.2097	.0044
	.0022	.0033	.0035	.0062	.0044	.0041	.0025					
4	3.8513	.4020	1.2898	2.9523	.1587	2.0225	1.7409	1.3947	1.0574	.0785	1.4395	.0388
	.0432	.0157	.0061	.0069	.0032	.0038	.0038					
5	4.9292	.4689	1.8015	2.6349	.0465	4.1504	1.4116	1.3116	1.0726	.0538	2.0053	.0152
	.1400	.0045	.0062	.0110	.0044	.0038	.0038					

MEAN SQUARES

BETWEEN	300.5631	6.4157	32.0135	342.1815	.0159	103.5345	366.7734	19.3233	9.4300	.1229	14.6064	.0042
	.0221	.0004	.0015	.0021	.0007	.0010	.0006					
WITHIN	2.7618	.0655	.7873	1.6426	.0014	1.4518	1.4075	.3970	.1775	.0020	.3294	.0001
	.0005	.0000	.0000	.0000	.0000	.0000	.0000					
D.F.-S	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350
	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350	4, 350					
F-RATIO	108.830	97.911	40.664	208.322	11.350	71.317	260.594	48.671	53.121	62.518	44.343	30.787
	45.603	21.172	98.322	49.126	64.422	73.647	77.300					
P-VALUE	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	.000	.000	.000	.000	.000	.000	.000					





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POOLED WITHIN CLUSTER CORRELATIONS  
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	SI02	TI02	AL203	FE203	MNO	MGO	CAO	NA2O	K2O	P2O5	S
SI02	1	1.0000									
TI02	2	-.2691	1.0000								
AL203	3	-.3562	-.0403	1.0000							
FE203	4	-.4472	-.5591	-.4352	1.0000						
MNO	5	-.1144	-.1605	-.3296	-.2822	1.0000					
MGO	6	-.3540	-.2096	-.0498	-.0343	-.0000	1.0000				
CAO	7	-.1945	-.0078	-.3163	-.0437	-.2437	-.1464	1.0000			
NA2O	8	-.3605	-.1589	-.1692	-.2365	-.5021	-.3342	-.2956	1.0000		
K2O	9	-.2150	-.2625	-.3067	-.3757	-.1056	-.0142	-.3323	-.2725	1.0000	
P2O5	10	-.1267	-.8079	-.3052	-.0176	-.1703	-.3630	-.0223	-.3538	-.0381	1.0000
S	11	-.0066	-.1180	-.2111	-.0178	-.0956	-.1849	-.0223	-.0544	-.1006	-.3430
CU	12	-.0169	-.0165	-.0021	-.2138	-.0501	-.0386	-.1982	-.0145	-.0751	-.5508
ZN	13	-.0598	-.0125	-.0465	-.1323	-.1499	-.1986	-.0317	-.2279	-.0403	-.1069
BA	14	-.2600	-.1244	-.0359	-.1971	-.0309	-.2681	-.3085	-.6981	-.5934	-.1542
V	15	-.2627	-.8798	-.5641	-.4527	-.1670	-.0387	-.1185	-.2284	-.2732	-.0434
CR	16	-.0836	-.4529	-.3826	-.3093	-.1218	-.1234	-.1185	-.1412	-.1857	-.0475
NI	17	-.0559	-.4226	-.3276	-.2417	-.2769	-.2318	-.1131	-.2673	-.4640	-.1330
SR	18	-.1711	-.0828	-.1489	-.0929	-.2822	-.3456	-.0780	-.2842	-.8585	-.0462
ZR	19	-.1218	-.1831	-.3822	-.2632	-.2927	-.0107	-.1819	-.2220		

	CU	ZN	BA	V	CR	NI	SR	ZR
CU	12	1.0000						
ZN	13	-.2424	1.0000					
BA	14	-.0039	-.0693	1.0000				
V	15	-.0129	-.0409	-.1614	1.0000			
CR	16	-.0246	-.0329	-.0155	-.4480	1.0000		
NI	17	-.0097	-.0165	-.1446	-.3908	-.6058	1.0000	
SR	18	-.0594	-.0966	-.1407	-.2771	-.0026	-.0895	1.0000
ZR	19	-.0135	-.0515	-.5421	-.2646	-.2646	-.4177	1.0000

CPU TIME USED 63.678 SECONDS

PAGE 11

BMDPKM - K MEANS CLUSTERING OF CASES

NO MORE CONTROL LANGUAGE.

PROGRAM TERMINATED

RUNID: 25083 ACCT: TM2001K PROJECT: 25083

25083 FIN

TIME: TOTAL: 00:01:06.600 CBSUPS: 070259133  
CPU: 00:00:42.818 I/O: 00:00:18.989  
CC/ER: 00:00:04.792 WAIT: 00:00:02.000

IMAGES READ: 1081 PAGES: 24

START: 22:29:34 APR 10, 1986 FIN: 22:30:32 APR 10, 1986

BMDP4M - FACTOR ANALYSIS  
BMDP STATISTICAL SOFTWARE, INC.  
1964 WESTWOOD BLVD. SUITE 202  
(213) 475-5700

PROGRAM REVISED APRIL 1982

MANUAL REVISED -- 1981

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TO SEE REMARKS AND A SUMMARY OF NEW FEATURES FOR  
THIS PROGRAM, STATE NEWS. IN THE PRINT PARAGRAPH.

PROGRAM CONTROL INFORMATION

/ PROBLEM TITLE IS 'NORGE'.  
/ INPUT VARIABLES ARE 19.  
/ VARIABLE NAMES ARE S102,T102,AL203,FE203,MNO,  
MGO,CAO,NA20,K20,P205,S,CU,  
ZN,BA,V,CR,NI,SR,ZR.  
/ FACTOR NUMBER=5.  
/ END

PROBLEM TITLE IS  
NORGE

NUMBER OF VARIABLES TO READ IN. . . . . 19  
NUMBER OF VARIABLES ADDED BY TRANSFORMATIONS. . . . . 0  
TOTAL NUMBER OF VARIABLES. . . . . 19  
NUMBER OF CASES TO READ IN. . . . . TO END  
CASE LABELING VARIABLES. . . . .  
MISSING VALUES CHECKED BEFORE OR AFTER TRANS. . . . . NEITHER  
BLANKS ARE. . . . . MISSING  
INPUT UNIT NUMBER. . . . . 5  
REWIND INPUT UNIT PRIOR TO READING. . . . . NO  
NUMBER OF WORDS OF DYNAMIC STORAGE. . . . . 79998

VARIABLES TO BE USED  
1 S102 2 T102 3 AL203 4 FE203 5 MNO  
6 MGO 7 CAO 8 NA20 9 K20 10 P205  
11 S 12 CU 13 ZN 14 BA 15 V  
16 CR 17 NI 18 SR 19 ZR

INPUT FORMAT IS  
FREE

MAXIMUM LENGTH DATA RECORD IS 80 CHARACTERS.

NUMBER OF VARIABLES TO BE USED. . . . . 19

WEIGHT VARIABLE . . . . .  
UNROTATED FACTORS ARE PRINCIPAL COMPONENTS. . . . .  
MAXIMUM NUMBER OF FACTORS . . . . . 5  
NUMBER OF FACTORS IS LIMITED TO THE NUMBER OF EIGENVALUES  
GREATER THAN 1.000  
TOLERANCE LIMIT FOR MATRIX INVERSION. . . . . .00010  
VARIMAX ROTATION IS PERFORMED.  
GAMMA . . . . . 1.0000  
MAXIMUM NUMBER OF ITERATIONS FOR ROTATION . . . . . 50  
CONVERGENCE CRITERION FOR ROTATION. . . . . .0000100  
KAISER'S NORMALIZATION. . . . . YES

DATA AFTER TRANSFORMATIONS FOR FIRST 5 CASES.  
 CASES WITH ZERO WEIGHTS AND MISSING DATA NOT INCLUDED.

CASE NO.	1	2	3	4	5	6	7	8	9	10
LABEL	SI02	TI02	AL203	FE203	MNO	MGO	CAO	NA2O	K2O	P2O5
	11	12	13	14	15	16	17	18	19	
	S	CU	ZN	BA	V	CR	NI	SR	ZR	
1	42.590	1.970	15.890	13.140	-151	6.600	9.850	3.630		
	.920	.0390	.00900	.00200	-.0340	-.0220	-.00800	-.0250	-.0210	-.240
2	45.030	1.840	15.030	11.630	-.183	5.010	11.880	3.780		
	.248	.00600	.00900	.00200	-.0300	-.0210	-.00700	-.0200	-.0330	-.239
3	45.050	1.360	15.640	11.320	.146	6.880	11.090	3.040		
	.432	.0160	.00700	.00300	-.0290	-.0330	-.0120	-.0160	-.0110	-.102
4	44.350	1.220	15.280	10.190	.135	8.220	10.840	2.100		
	.580	.00700	.00700	.00700	-.0250	-.0340	-.0160	-.0140	-.00900	-.107
5	46.180	.985	15.370	9.320	-.126	8.950	10.230	1.980		
	.431	.00600	.00600	.00500	-.0210	-.0390	-.0180	-.01000	-.00700	-.0650

NUMBER OF CASES READ. . . . . 355

STATISTICS FOR EACH VARIABLE

VARIABLE	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION	SMALLEST VALUE	SMALLEST STANDARD SCORE	FIRST CASE FOR SMALLEST	LARGEST VALUE	LARGEST STANDARD SCORE	FIRST CASE FOR LARGEST
1 ST02	45.75051	2.47523	-.541028-001	27.8200	-7.24	220	61.6000	6.40	285
2 TI02	1.54634	.37051	-.239606	-.6530	-2.41	92	2.4800	2.52	100
3 AL203	15.15321	1.06776	-.704643-001	12.2200	-2.75	254	20.5500	5.05	209
4 FE203	11.46994	2.34317	-.204288	8.5500	-1.25	221	33.6000	9.44	220
5 MNO	1.6192	.03958	-.244458	-.0740	-2.22	301	.7200	14.10	285
6 MGO	7.10707	1.61407	-.227108	2.5700	-2.81	285	18.8200	7.26	138
7 CAO	9.90781	2.35285	-.237474	-.8920	-3.83	210	14.2800	1.86	152
8 NA2O	3.09178	.78158	-.252794	-.2370	-3.65	297	6.1000	3.85	211
9 K2O	4.6270	.53110	1.19968	.0140	-.81	114	4.3700	7.39	285
10 P2O5	15366	.05773	-.375672	.0310	-2.12	92	4.4040	7.92	286
11 S	4.8051	.70051	1.45786	-.0040	-.68	297	6.0300	7.92	222
12 CU	0.0895	.01349	1.50745	-.0000	-.66	114	1.660	11.64	199
13 ZN	0.1279	.02702	2.11205	-.0050	-.29	63	-.3590	12.81	216
14 BA	0.0501	.00498	-.993066	-.0000	-.01	101	-.0670	12.45	285
15 V	0.02958	.00568	-.192100	-.0130	-2.92	285	-.0440	2.54	100
16 CR	0.02670	.00807	-.302196	-.0080	-2.32	99	-.0550	3.51	274
17 NI	0.1163	.00439	-.377880	-.0050	-1.51	284	-.0260	3.27	254
18 SR	0.1517	.00492	-.324332	-.0010	-2.88	138	-.0350	4.03	252
19 ZR	0.1293	.00389	-.300840	-.0030	-2.55	92	-.0250	3.10	187

CASE NUMBERS ABOVE REFER TO DATA MATRIX BEFORE ANY CASES  
 HAVE BEEN DELETED DUE TO MISSING DATA.  
 CASES WITH ZERO WEIGHTS ARE NOT INCLUDED.

CORRELATION MATRIX

	SI02	TI02	AL203	FE203	MNO	5	MGO	6	CAO	7	NA2O	8	9	10	11	12	13
SI02	1																
TI02	1.000	1															
AL203	-.020	-.488	1														
FE203	-.138	.457	1.000	1													
MNO	-.544	.298	-.291	1.000	1												
MGO	-.126	-.352	.264	-.301	1.000	1											
CAO	-.518	-.107	-.407	-.075	-.158	1.000	1										
NA2O	-.473	-.462	-.142	-.057	-.188	-.627	1.000	1									
K2O	-.225	-.359	-.473	-.273	-.098	-.167	-.297	1.000	1								
S	-.071	-.891	-.364	-.315	-.274	-.425	-.069	-.337	1.000	1							
CU	-.028	-.148	-.304	-.221	-.014	-.089	-.435	-.465	-.201	1.000	1						
ZN	-.113	-.029	-.190	-.416	-.132	-.181	-.449	-.175	-.067	-.460	1.000	1					
BA	-.253	-.201	-.210	-.143	-.415	-.059	-.363	-.340	-.049	-.270	-.270	1.000	1				
CR	-.050	-.941	-.480	-.507	-.254	-.311	-.140	-.333	-.428	-.315	-.428	-.333	1.000	1			
NI	-.125	-.674	-.526	-.308	-.389	-.341	-.005	-.256	-.315	-.315	-.315	-.256	-.315	1.000	1		
SR	-.141	-.611	-.496	-.411	-.363	-.414	-.071	-.317	-.417	-.417	-.417	-.317	-.417	-.317	1.000	1	
ZR	-.078	-.314	-.377	-.180	-.014	-.439	-.659	-.481	-.195	-.195	-.195	-.481	-.481	-.195	-.412	1.000	1
V	-.072	-.894	-.398	-.346	-.357	-.415	-.067	-.339	-.472	-.472	-.472	-.339	-.339	-.472	-.082	-.082	1.000

	BA	V	14	15	16	17	18	19
BA	1							
V	1.000	1						
CR	-.217	-.665	1.000					
NI	-.102	-.664	-.745	1.000				
SR	-.174	-.226	-.137	-.014	1.000			
ZR	-.323	-.762	-.617	-.574	-.367	1.000		

$TiO_2 \rightarrow P_2O_5$   
 $V \rightarrow Zr$   
 $K_2O \rightarrow Ba$   
 $P_2O_5 \rightarrow V$   
 $Zr$   
 $Sr \rightarrow Zr$   
 $Cr \rightarrow Ni$

SQUARED MULTIPLE CORRELATIONS (SMC) OF EACH VARIABLE WITH ALL OTHER VARIABLES

1	SI02	.81155
2	TI02	-.97192
3	AL203	-.71166
4	FE203	-.90666
5	MNO	-.67049
6	MGO	-.86605
7	CAO	-.93058
8	NA2O	-.86671
9	K2O	-.87106
10	P2O5	-.90964
11	S	-.71145
12	CU	-.45898
13	ZN	-.47114
14	BA	-.74659
15	V	-.93869
16	CR	-.67532
17	NI	-.76595
18	SR	-.70943
19	ZR	-.91198

CONDITION NUMBER = 331.5

COMMUNALITIES OBTAINED FROM 5 FACTORS AFTER 1 ITERATIONS

THE COMMUNALITY OF A VARIABLE IS ITS SQUARED MULTIPLE CORRELATION WITH THE FACTORS.

1	SI02	.8628
2	TI02	-.9492
3	AL203	-.7047
4	FE203	-.8332
5	MNO	-.7739
6	MGO	-.7024
7	CAO	-.8141
8	NA2O	-.8778
9	K2O	-.8558
10	P2O5	-.9180
11	S	-.7817
12	CU	-.5299
13	ZN	-.5050
14	BA	-.8520
15	V	-.8531
16	CR	-.7291
17	NI	-.8312
18	SR	-.7157
19	ZR	-.8932

FACTOR VARIANCE EXPLAINED CUMULATIVE PROPORTION OF TOTAL VARIANCE

1	6.210153	.326850
2	3.793553	.526511
3	2.289555	.647014
4	1.649998	.733856
5	1.039692	.788576
6	-.827203	.832113
7	.701446	.869032
8	-.540840	.897497
9	-.459307	.921671
10	-.331418	.939114
11	-.232961	.951375
12	-.212384	.952553
13	-.202973	.973236
14	-.167335	.982043
15	-.133276	.989058
16	-.093414	.993974
17	-.069399	.997627
18	-.026361	.999014
19	-.018731	1.000000

5 factors = 80%

THE VARIANCE EXPLAINED BY EACH FACTOR IS THE EIGENVALUE FOR THAT FACTOR.

TOTAL VARIANCE IS DEFINED AS THE SUM OF THE DIAGONAL ELEMENTS OF THE CORRELATION MATRIX.

UNROTATED FACTOR LOADINGS (PATTERN)  
 FOR PRINCIPAL COMPONENTS

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
SI02	.118	-.139	-.879	-.044	-.233
TI02	<u>1.917</u>	-.214	-.073	-.012	-.238
AL203	-.632	.289	.072	-.359	-.296
FE203	.587	(-.540)	(-.611)	.076	-.115
MNO	.328	.319	.165	<u>1.733</u>	-.027
MGO	-.552	.193	(-.549)	-.194	-.154
CAO	-.098	<u>1.889</u>	-.003	.107	-.059
NA2O	.573	(-.018)	.411	(-.609)	-.094
K2O	-.542	-.494	.505	-.194	-.159
P2O5	<u>1.862</u>	.147	.070	-.072	.378
S	<u>1.783</u>	-.022	.212	-.350	.037
CU	-.140	(-.567)	-.186	-.225	-.323
ZN	-.120	<u>1.687</u>	-.011	-.130	-.037
BA	-.315	<u>1.435</u>	.523	.505	.187
V	<u>1.869</u>	.264	-.124	-.031	.105
CR	→ <u>1.766</u>	-.138	-.050	-.242	.251
NI	→ <u>1.758</u>	-.211	-.027	-.094	.450
SR	.440	(-.640)	.030	-.017	.334
ZR	<u>1.880</u>	-.154	.049	-.018	.305
VP	6.210	3.794	2.290	1.650	1.040

THE VP FOR EACH FACTOR IS THE SUM OF THE SQUARES OF THE ELEMENTS OF THE COLUMN OF THE FACTOR LOADING MATRIX CORRESPONDING TO THAT FACTOR. THE VP IS THE VARIANCE EXPLAINED BY THE FACTOR.

ORTHOGONAL ROTATION, GAMMA = 1.0000

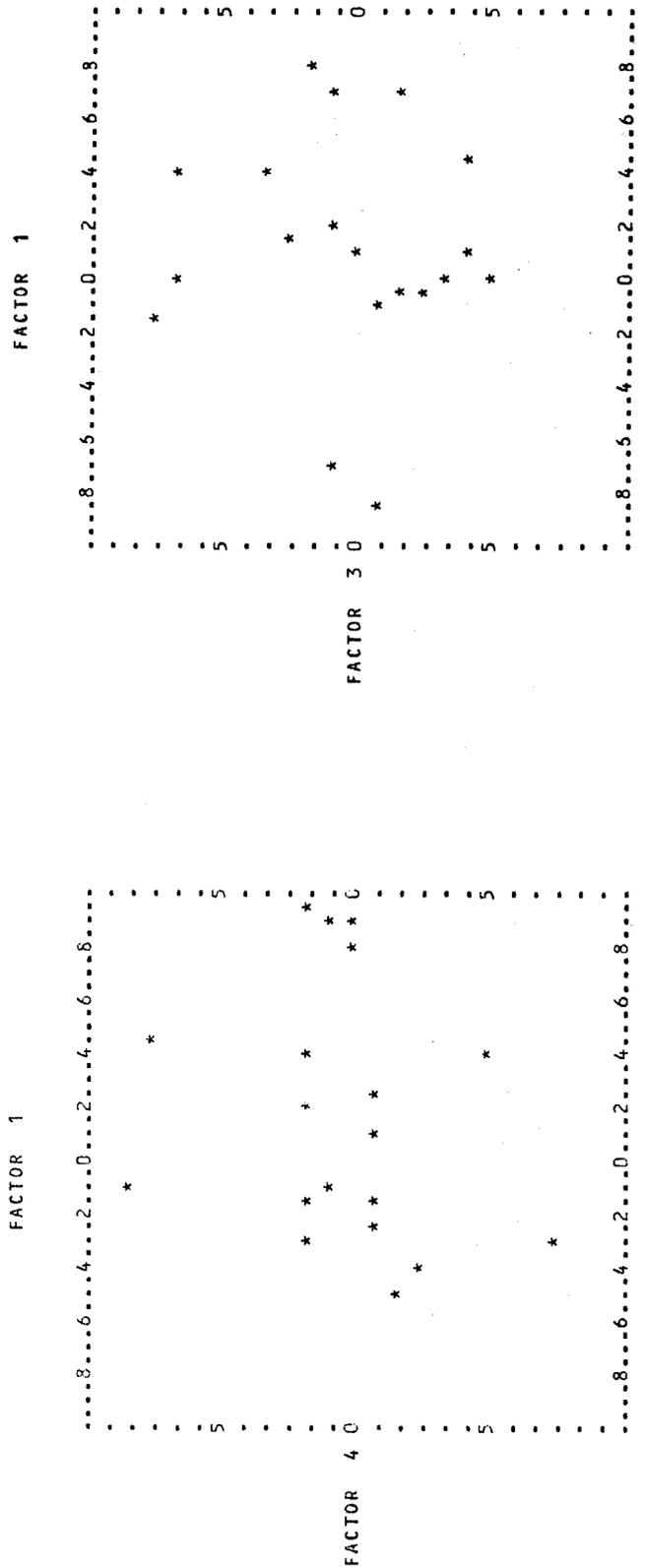
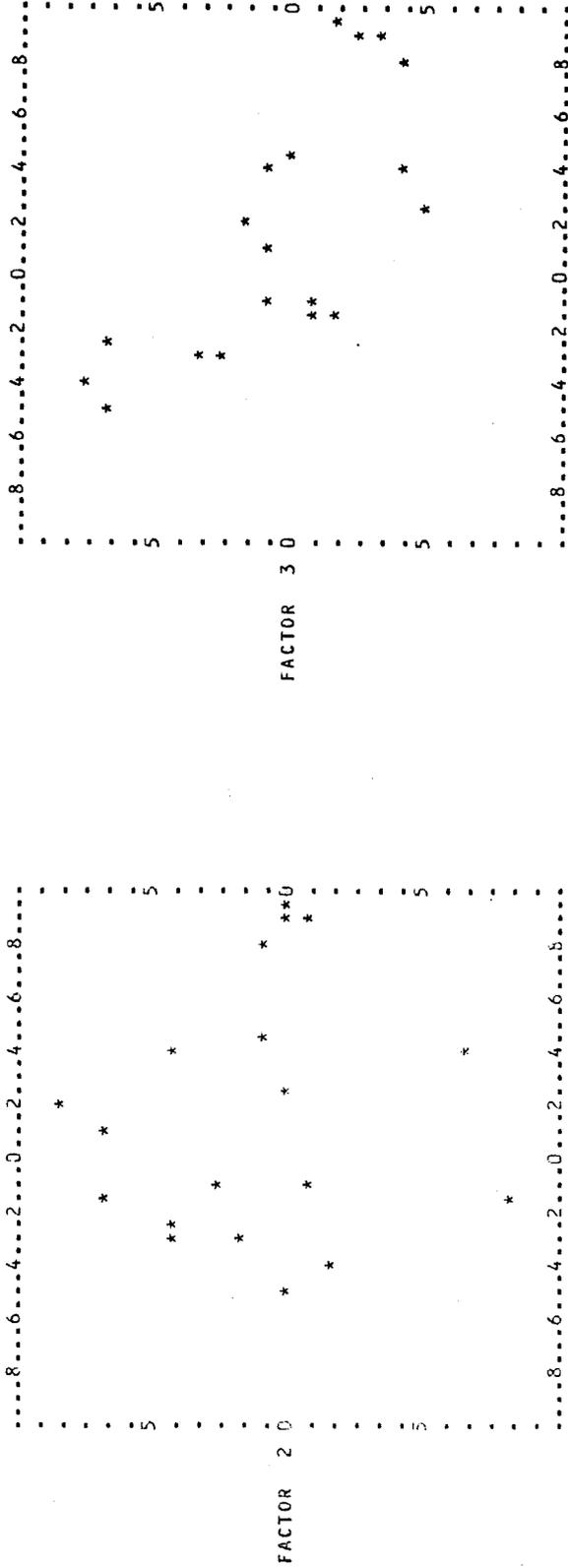
ITERATION	SIMPLICITY
0	CRITERION
1	-5.733101
2	-7.647883
3	-7.934976
4	-7.960822
5	-7.963493
6	-7.963759

ROTATED FACTOR LOADINGS (PATTERN)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
SI02					
TI02	-.085	-.104	-.091	Sc → .868	-.289
AL203	.918	.024	-.314		-.078
FE203	-.259	.411	.679	AL → .050	.071
MNO	.376	.449	-.431		-.192
MGO	.251	-.003	-.530	Ms → .115	.646
CAO	-.320	.165	-.219	+Ms → -.722	.062
NA2O	-.151	-.845	-.063		-.239
K2O	.445	.117	-.027	Na → .730	-.365
P2O5	-.277	.414	.315		.702
S	-.936	-.040	-.136		-.019
CU	.192	.819	.156		.120
ZN	-.144	.680	-.128		-.145
BA	.080	.678	.086		.152
V	-.118	.218	-.085		-.071
CR	-.820	.111	-.387		.882
NI	-.487	.014	.683	G → .021	-.132
SR	-.402	-.144	N → .763		-.032
ZR	.401	+.Sr → -.705	-.083		.119
	.905	-.052	-.241		-.185
VP	4.527	3.484	2.525	2.309	2.139

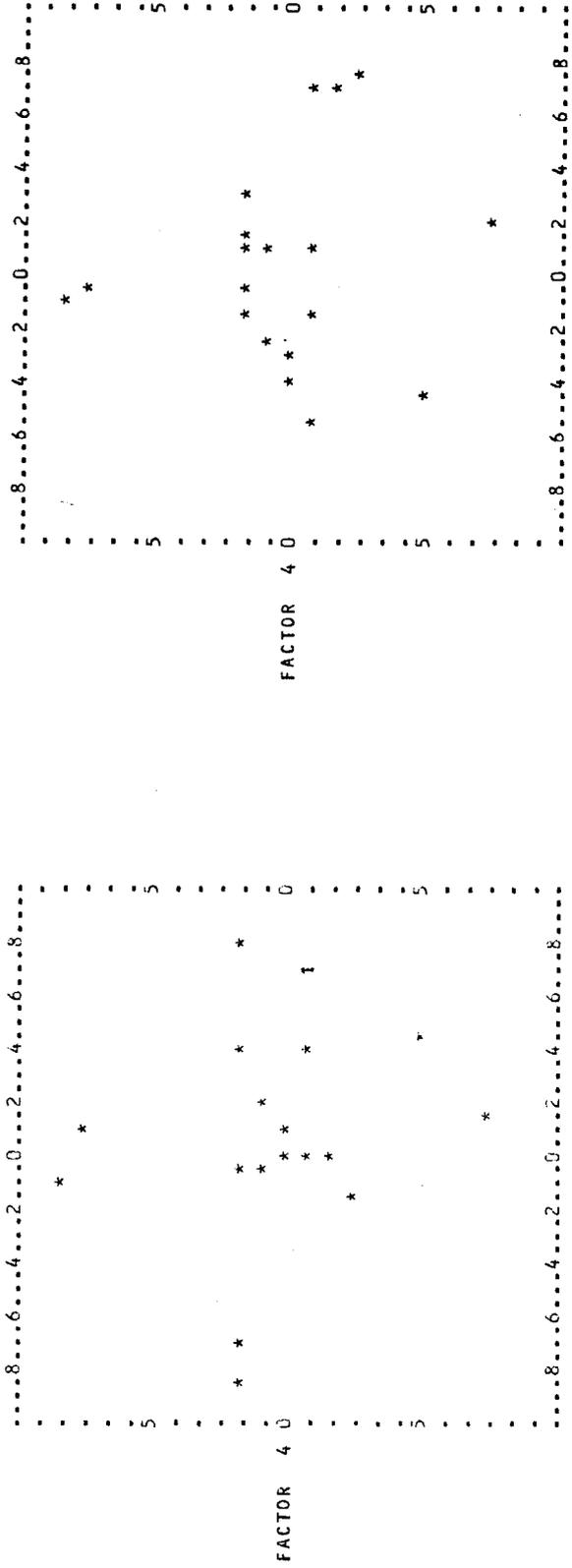
THE VP FOR EACH FACTOR IS THE SUM OF THE SQUARES OF THE ELEMENTS OF THE COLUMN OF THE FACTOR PATTERN MATRIX CORRESPONDING TO THAT FACTOR. WHEN THE ROTATION IS ORTHOGONAL, THE VP IS THE VARIANCE EXPLAINED BY THE FACTOR.

ROTATED FACTOR LOADINGS



OVERLAP IS INDICATED BY A DOLLAR SIGN. SCALE IS FROM -1 TO +1.

ROTATED FACTOR LOADINGS



OVERLAP IS INDICATED BY A DOLLAR SIGN. SCALE IS FROM -1 TO +1.



ESTIMATED FACTOR SCORES AND MAHALANOBIS DISTANCES (CHI-SQUARE S) FROM EACH CASE TO THE CENTROID OF ALL CASES FOR THE ORIGINAL DATA (19 D.F.) FACTOR SCORES (5 D.F.) AND THEIR DIFFERENCE (14 D.F.). EACH CHI-SQUARE HAS BEEN DIVIDED BY ITS DEGREES OF FREEDOM.

CASE LABEL	CHISQ/DF	CHISQ/DF	CHISQ/DF	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
1	1.573	.985	1.783	1.792	.408	.581	-.374	-1.034
2	.648	.393	.739	1.173	-.565	-.137	-.401	-.299
3	.358	.196	.416	-.590	.005	.077	-.016	-.791
4	.255	.320	.232	-.754	-.254	.688	-.586	.390
5	.540	.656	.499	-1.598	-.116	.718	-.337	.288
6	1.128	1.189	1.106	-.922	.005	2.095	.202	.817
7	.479	.523	.463	-1.536	-.307	.016	-.299	.275
8	.677	.956	.577	-1.902	-.290	-1.025	-.098	-.135
9	.488	.781	.383	-1.920	-.148	-.248	.188	-.313
10	.486	.618	.439	-1.315	.437	.702	-.664	.487
11	.866	.342	1.053	-1.095	-.352	.088	-.252	-.559
12	.320	.463	.269	-1.409	-.367	.140	-.382	.168
13	.361	.583	.282	-1.548	-.395	.153	-.531	-.240
14	.733	.861	.687	-1.736	-.523	.316	-.955	-.056
15	.391	.257	.439	-.891	-.447	.321	-.366	-.226
16	.719	.454	.813	-.904	-.521	.646	-.406	.775
17	.565	.467	.600	1.505	.045	-.069	.149	-.204
18	.207	.075	.254	-.315	-.329	-.013	-.396	-.607
19	.356	.624	.261	-1.517	-.320	.502	.306	-.206
20	.269	.369	.233	-1.170	-.415	.228	-.458	.294
21	.395	.276	.437	.908	-.144	-.589	.315	-.329
22	.307	.253	.326	.391	-.277	-.962	.055	-.247
23	.727	.196	.917	.397	.388	-.692	-.363	-.197
24	.557	.396	.614	.227	-.283	-.287	-.839	-.904
25	.884	.362	.528	.793	.482	.926	.226	-.154
26	.824	.341	.996	.669	.426	.204	-.148	-.720
27	.279	.336	.259	-1.074	-.660	.204	.757	-.129
28	.392	.692	.284	-1.489	-.254	-.298	.312	-.078
29	.261	.070	.329	-.023	-.458	.167	-.684	-.093
30	.232	.115	.274	-.267	-.044	-.170	-.060	-.608
31	.356	.152	.629	-.006	-.575	-.647	-.957	-.695
32	.290	.193	.325	-.161	-.411	-1.132	.132	-.572
33	.681	.650	.692	-.755	-.022	-.915	1.040	-.352
34	.160	.210	.142	.411	-.216	.704	.428	-.747
35	.390	.404	.385	1.077	-.395	.046	.750	-.417
36	.782	.325	.945	.503	-.052	-.041	-.237	-.749
37	.331	.168	.389	-.354	-.241	-.041	-.986	-.284
38	.798	.262	.990	-.378	-.357	.785	-.420	-.023
39	.521	.128	.661	-.759	-.203	.691	-.065	-.099
40	.889	.370	1.074	-.777	-.816	-.297	-.122	-.238
41	.685	.428	.777	.106	-.244	-.087	-.447	1.049
42	.293	.137	.348	-.004	-.214	-.297	-.732	-.067
43	.537	.235	.644	-.931	-.214	.786	-.420	-.611
44	1.003	.144	1.309	-.213	-.201	.145	-.065	-.795
45	.945	.714	1.028	.953	-.518	-.145	-1.522	-.238
46	.901	.272	1.126	-.337	-.005	-.969	-.421	-.357
47	1.124	.612	1.306	-.855	-.236	.986	-.447	1.049
48	.652	.535	.694	-.351	-.416	1.357	-.731	-.067
49	1.172	.947	1.252	-.393	-.090	1.838	-.908	-.611
50	.366	.258	.405	.724	-.215	-.127	-.273	-.795

ESTIMATED FACTOR SCORES AND MAHALANOBIS DISTANCES (CHI-SQUARE S) FROM EACH CASE TO THE CENTROID OF ALL CASES FOR THE ORIGINAL DATA (19 D.F.) FACTOR SCORES (5 D.F.) AND THEIR DIFFERENCE (14 D.F.). EACH CHI-SQUARE HAS BEEN DIVIDED BY ITS DEGREES OF FREEDOM.

CASE LABEL	CHISQ/DF	CHISQ/DF	CHISQ/DF	CHISQ/DF	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
51	19	14	5	14	-.536	-.529	-1.326	-.213	-.410
52	441	355	471	420	-.441	-.248	.476	.913	-.690
53	147	190	028	015	-.147	-.269	-.186	.007	-.184
54	956	251	1207	421	-.956	-.183	-.587	-.266	-.792
55	466	421	481	144	-.466	-.062	-1.186	-.649	-.505
56	421	279	472	655	-.421	-.080	-.498	-.563	-.628
57	670	322	794	734	-.670	-.197	.875	-.238	-.458
58	1125	248	1438	573	1.125	-.029	.561	-.393	-.663
59	684	1239	485	912	-.684	-.288	-.932	1.006	-.758
60	894	607	997	351	-.894	-.351	1.251	-.506	-.214
61	270	097	331	401	-.270	-.382	-.399	-.112	-.063
62	488	573	458	1494	-.488	-.541	.390	-.422	-.104
63	377	520	326	1351	-.377	-.524	-.578	-.198	-.359
64	378	095	479	193	-.378	-.511	-.214	-.017	-.361
65	337	089	426	104	-.337	-.335	-.168	-.269	-.471
66	326	255	352	860	-.326	-.223	-.142	-.658	-.175
67	524	625	488	1255	-.524	-.040	-1.202	-.180	-.265
68	498	343	554	088	-.498	-.434	-.914	-.827	-.006
69	800	203	1013	781	-.800	-.125	-.525	-.191	-.278
70	426	306	469	130	-.426	-.096	-1.197	-.235	-.128
71	642	096	837	018	-.642	-.121	-.675	-.094	-.017
72	864	619	951	549	-.864	-.027	-1.657	-.197	-.088
73	745	717	726	113	-.745	-.113	-1.563	-.966	-.453
74	1415	1269	1467	928	1.415	1.751	-.090	1.009	1.180
75	2539	2905	2408	1777	2.539	2.914	.093	1.289	1.096
76	481	542	459	882	-.481	-.019	1.297	-.537	-.522
77	1278	956	1393	381	1.278	-.188	1.783	-.839	-.846
78	761	1267	580	476	-.761	-.339	2.395	-.229	-.451
79	750	441	860	1016	-.750	-.615	.845	-.013	-.287
80	1247	1337	1215	009	1.247	-.678	2.331	-.615	-.642
81	2026	1152	2338	101	2.026	-.917	2.121	-.612	-.189
82	1005	1274	909	187	1.005	-.993	1.914	-1.275	-.240
83	675	858	609	688	-.675	-.739	1.495	-.879	-.704
84	954	1717	682	091	1.954	-.663	2.170	-1.751	-.602
85	465	272	533	454	-.465	-.070	-.264	-.866	-.572
86	898	345	1093	623	-.898	-.316	-.269	-.782	-.744
87	599	389	389	718	-.599	-.673	-.001	-.713	-.683
88	326	396	301	1210	-.326	-.434	.194	-.368	-.392
89	727	506	806	1409	-.727	-.125	-.118	-.709	-.098
90	865	494	997	1373	-.865	-.410	-.272	-.100	-.577
91	218	464	130	917	-.218	-.402	-.639	-.623	-.722
92	839	1375	647	2269	1.839	-.278	-.828	-.799	-.571
93	489	604	447	1643	-.489	-.230	.029	-.004	-.518
94	568	715	515	1592	-.568	-.820	.143	-.577	-.117
95	399	154	487	060	-.399	-.788	-.270	-.147	-.220
96	683	300	820	501	-.683	-.719	-.790	-.056	-.328
97	741	689	759	1601	-.741	-.512	-.020	-.257	-.745
98	278	087	347	084	-.278	-.215	-.365	-.328	-.372
99	564	1035	395	1590	-.564	-.174	-1.442	-.635	-.373
100	893	1570	651	1898	-.893	-.568	-1.560	-1.128	-.471

ESTIMATED FACTOR SCORES AND MAHALANOBIS DISTANCES (CHI-SQUARE S) FROM EACH CASE TO THE CENTROID OF ALL CASES FOR THE ORIGINAL DATA (19 D.F.) FACTOR SCORES (5 D.F.) AND THEIR DIFFERENCE (14 D.F.). EACH CHI-SQUARE HAS BEEN DIVIDED BY ITS DEGREES OF FREEDOM.

CASE LABEL	CHISQ/DF	19	CHISQ/DF	5	CHISQ/DF	14	FACTOR	1	FACTOR	2	FACTOR	3	FACTOR	4	FACTOR	5
101	.671	.961	.567	1.539	-.497	-1.470	-.165	-.039								
102	.990	.842	1.043	1.466	-.024	-1.037	.182	.975								
103	.396	.460	.374	-.183	-.143	-1.437	.294	-.304								
104	.339	.419	.310	-.075	.226	-1.315	.545	-.113								
105	3.623	2.655	3.968	.245	-.284	1.025	1.025	2.723								
106	.240	.390	.186	-.124	-.169	-1.333	.358	-.047								
107	.301	.611	.190	-.015	-.225	-1.689	.147	-.358								
108	.227	.348	.184	.068	-.234	-1.148	.408	-.443								
109	.310	.238	.335	.165	-.130	-.993	.331	-.220								
110	.277	.397	.234	.562	.470	-.589	.773	-.708								
111	.485	.287	.555	.417	.929	-.228	.586	.040								
112	1.282	1.039	1.362	-.665	-.832	1.832	-.787	-.433								
113	.358	.120	.443	-.269	-.237	-.242	.583	-.275								
114	4.443	2.912	4.990	-.019	1.611	-.334	-3.338	-.841								
115	.720	.272	.880	-.213	-.047	.070	.588	.980								
116	.399	.499	.363	1.174	-.188	-1.039	-.018	.020								
117	.754	.849	.720	1.723	-.179	-1.108	-.065	-.114								
118	.307	.286	.314	-.126	-.018	-1.184	.113	-.020								
119	.143	.090	.162	-.274	.033	-.576	-.105	-.170								
120	.337	.293	.353	.748	.060	-.857	-.294	-.290								
121	.666	.690	.657	1.484	-.058	.644	-.681	-.603								
122	.542	.267	.641	.805	-.563	-.608	.026	-.036								
123	.286	.053	.369	.383	-.066	-.104	-.068	-.314								
124	.779	.691	.811	1.389	1.162	.179	-.277	-.256								
125	.877	.425	1.039	-.740	-.040	-.880	.233	-.863								
126	1.653	1.064	1.863	1.504	-.813	-1.069	-1.108	-.160								
127	.467	.371	.501	1.996	-.364	-.760	-1.042	-.146								
128	.283	.256	.292	-.256	-.288	.198	-1.006	-.283								
129	.819	.463	.946	.610	-.345	1.040	-.854	-.110								
130	.628	.480	.681	-.545	-.388	1.199	-.453	.556								
131	.270	.136	.318	-.689	-.296	.159	-.063	-.297								
132	.614	.362	.704	-.155	.414	.459	1.151	-.281								
133	.439	.115	.555	-.215	-.588	-.304	.132	-.268								
134	.332	.214	.374	-.813	-.196	.424	-.196	.393								
135	.284	.519	.199	-.387	-.223	-1.548	-.020	-.001								
136	.243	.249	.241	-.094	-.035	-.910	.581	-.266								
137	.521	.268	.612	.473	-.361	-.784	-.276	-.541								
138	4.961	6.997	4.234	1.313	.481	-.071	-5.738	.319								
139	.714	.263	.875	-.117	.641	-.623	.706	-.053								
140	.327	.564	.242	1.539	-.055	.261	-.520	-.567								
141	.546	.661	.505	1.584	-.185	.559	-.353	-.064								
142	.487	.445	.502	1.422	-.198	.344	-.198	.064								
143	1.026	.654	1.159	-.043	1.545	-.329	.810	.339								
144	.446	.581	.398	-.071	.018	1.670	-.281	-.176								
145	.334	.075	.427	-.036	-.327	-.369	.235	.272								
146	.591	.211	.726	-.276	-.183	.386	.072	.889								
147	.237	.136	.273	-.291	-.243	-.037	-.662	-.309								
148	.904	1.133	.823	2.094	-.383	.879	.446	-.401								
149	.585	.206	.721	-.411	-.700	.333	-.103	-.497								
150	.190	.085	.228	-.137	-.424	-.045	-.411	-.233								

ESTIMATED FACTOR SCORES AND MAHALANOBIS DISTANCES (CHI-SQUARE S) FROM EACH CASE TO THE CENTROID OF ALL CASES FOR THE ORIGINAL DATA (19 D.F.) FACTOR SCORES ( 5 D.F.) AND THEIR DIFFERENCE ( 14 D.F.). EACH CHI-SQUARE HAS BEEN DIVIDED BY ITS DEGREES OF FREEDOM.

CASE LABEL	NO.	CHISQ/DF	CHISQ/DF	CHISQ/DF	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
151	320	.318	.321	.393	-.396	-1.131	-.008	-.039	
152	.626	.420	.699	-.757	-1.047	-.509	-.299	-.286	
153	.273	.117	.328	.352	-.562	-.252	.095	-.275	
154	.526	.744	.449	1.159	-.126	-1.429	-.543	.142	
155	.266	.347	.237	-1.010	-.373	-.464	.525	-.289	
156	.498	.559	.477	-1.481	-.002	.452	-.002	.629	
157	.365	.521	.309	-1.332	-.316	.338	-.156	.768	
158	.538	.485	.556	-1.378	-.498	.128	-.416	-.299	
159	.345	.563	.268	-1.556	-.486	.304	-.241	-.080	
160	.602	.384	.679	1.007	-.883	-.012	-.086	-.343	
161	.725	.776	.707	-1.051	-.212	.345	-1.506	.587	
162	.496	.413	.526	-.743	-.447	.465	-.915	.511	
163	.417	.228	.484	-.038	-.600	-.695	-.005	-.544	
164	.262	.135	.307	-.140	-.135	.278	-.129	.129	
165	.504	.437	.528	1.012	-.744	.234	-.639	.376	
166	.312	.298	.298	.564	-.326	-.885	.153	.572	
167	.459	.426	.470	.845	-.526	-.904	-.499	.273	
168	.399	.235	.458	1.023	-.116	-.218	-.078	-.246	
169	.738	.569	.798	1.446	-.633	.099	.585	-.038	
170	.813	.515	.920	1.528	-.281	.233	.026	.329	
171	.647	.219	.800	1.033	-.037	-.124	-.042	-.042	
172	.397	.343	.417	.735	-.054	.303	.859	-.584	
173	1.152	1.085	1.175	-.334	-.822	1.886	-1.002	-.284	
174	.283	.189	.317	-.550	-.192	.755	-.023	.189	
175	.396	.539	.345	-1.378	-.382	-.404	-.370	-.590	
176	.279	.476	.209	-1.117	-.193	-.462	-.593	-.728	
177	.486	.114	.620	.445	-.448	.332	.225	-.095	
178	.166	.117	.184	.623	-.198	-.373	.059	.132	
179	.441	.595	.386	1.523	-.401	-.674	-.199	-.022	
180	.448	.887	.291	1.362	-.382	-1.545	-.034	-.223	
181	.478	.932	.316	1.319	-.335	-1.635	-.112	.349	
182	.571	.648	.544	1.218	-.067	-1.282	.093	.314	
183	.458	.394	.481	.059	-.491	-1.090	-.705	-.206	
184	.275	.484	.200	.235	-.094	-1.506	-.037	-.299	
185	.513	.172	.634	-.043	-.258	.259	.788	-.325	
186	.300	.136	.359	.054	-.404	-.067	.496	.512	
187	4.631	.621	6.063	.544	-.077	.188	1.582	-.514	
188	.590	.124	.756	.158	-.409	.431	.237	-.428	
189	.649	.278	.782	.065	-.221	.485	1.011	-.281	
190	.758	.313	.917	.032	-.162	.440	.835	-.806	
191	2.049	.678	2.539	1.477	-.092	.578	.864	-.348	
192	1.539	.612	1.870	1.019	-.092	.631	1.124	-.587	
193	.414	.043	.547	.194	-.021	-.295	.048	-.294	
194	.457	.150	.567	-.002	.333	-.784	-.348	-.299	
195	.572	.454	.614	.566	1.101	-.784	-.008	-.354	
196	1.154	1.356	1.082	-.598	1.612	1.704	-.235	.930	
197	1.069	1.149	1.040	-.590	-.710	1.913	-1.107	.079	
198	2.779	3.771	2.424	.068	3.208	1.971	1.419	1.631	
199	9.585	11.616	8.860	-.238	7.222	-.892	-1.173	-1.923	
200	.526	.394	.573	-.846	-.359	-.748	-.732	-.177	

ESTIMATED FACTOR SCORES AND MAHALANOBIS DISTANCES (CHI-SQUARE S) FROM EACH CASE TO THE CENTROID OF ALL CASES FOR THE ORIGINAL DATA (19 D.F.) FACTOR SCORES (5 D.F.) AND THEIR DIFFERENCE (14 D.F.). EACH CHI-SQUARE HAS BEEN DIVIDED BY ITS DEGREES OF FREEDOM.

CASE LABEL	CHISQ/DF 19	CHISQ/DF 14	CHISQ/DF 5	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
201	.459	.370	.491	-.699	-.772	.720	-.479	-.137
202	1.498	2.455	1.156	-.518	-.208	2.307	-1.402	2.163
203	.237	.298	.215	-.774	-.346	.751	-.430	-.145
204	.306	.430	.262	-1.407	-.284	.107	-.253	-.119
205	.716	.530	.783	-1.192	-.531	.533	.287	-.763
Max 206	10.630	11.474	10.329	-3.131	<u>4.868</u>	-4.167	-.748	-2.438
207	.477	.259	.555	-.462	-.526	-.662	-.606	-.003
208	1.411	.720	1.657	-.859	.467	-.148	1.370	-.865
209	3.208	3.382	3.145	-.457	2.627	3.021	-.470	.672
210	4.862	5.803	4.525	-.584	2.171	.112	-4.778	-1.060
211	2.422	2.407	2.427	-.074	1.431	-.802	2.754	-1.324
Min 212	3.869	8.172	2.333	-.635	<u>5.232</u>	1.966	3.037	-.002
213	.750	.631	.793	-.561	-.146	1.361	.347	-.920
214	.713	.318	.854	-.708	-.432	.280	.255	-.872
215	1.862	2.179	1.749	-.221	1.644	2.674	.938	-.331
216	12.972	4.996	15.820	-.414	<u>4.448</u>	-.198	-1.937	1.112
217	.860	1.046	.794	1.348	1.360	-.196	-.713	-1.009
218	4.774	2.389	5.625	-.465	2.129	-.736	-.077	2.578
Min 219	3.835	7.200	2.633	-.914	<u>4.266</u>	-1.905	-3.335	-1.488
Min 220	8.451	12.285	7.082	-.739	<u>3.492</u>	-2.039	-6.439	-1.737
221	1.298	.636	1.535	-1.632	.078	.187	.666	-.666
Min 222	7.677	10.601	6.632	1.925	<u>5.102</u>	2.170	-.936	2.542
223	2.163	1.941	2.243	1.611	2.203	1.448	.203	-.345
224	3.921	2.832	4.310	1.579	-.035	2.432	1.910	-1.450
Min 225	3.151	4.439	2.692	1.423	<u>3.823</u>	1.344	.935	1.695
226	1.184	.881	1.292	-1.198	-.395	.296	-1.214	1.120
227	.641	.445	.710	-1.323	-.297	-.534	-.321	.013
228	.276	.467	.208	-1.042	-.109	-1.091	-.046	-.207
229	.633	.066	.835	-.024	-.118	.131	.338	-.431
230	.364	.288	.391	-1.025	-.165	-.006	.293	-.526
231	.302	.451	.249	-1.035	-.516	.791	-.521	.144
232	.483	.196	.585	-.887	-.209	.352	-.034	.159
233	.235	.070	.233	-.151	-.533	-.095	-.131	-.127
234	.262	.332	.238	.475	-.626	-.798	-.629	-.105
235	.420	.460	.406	.642	-.880	.057	-1.038	-.177
236	.171	.095	.198	.111	-.102	-.620	.032	-.263
237	.379	.696	.266	-1.449	-.500	-.940	.480	.136
238	.390	.451	.368	1.136	-.159	.670	.523	-.269
239	.358	.793	.202	1.616	-.638	-.876	-.363	.218
240	.838	.793	.854	1.683	-.708	-.596	-.464	-.244
241	.480	.756	.382	1.579	-.435	-1.003	.031	-.304
242	.288	.201	.242	.286	-.149	-.843	.428	-.091
243	.301	.236	.324	.283	-.272	-.941	.230	-.292
244	.376	.383	.373	-.471	-.587	-1.209	.330	-.302
245	.268	.292	.245	.296	-.463	-1.013	.061	.017
246	.434	.222	.509	.415	-.632	-.832	.122	.123
247	.387	.608	.308	1.321	-.233	.247	.945	-.533
248	.795	.586	.869	.494	-.616	-.067	1.299	-.783
249	.502	.277	.582	1.072	-.226	-.296	-.259	-.182
250	.959	.060	1.280	-.127	-.126	-.175	-.471	-.118

ESTIMATED FACTOR SCORES AND MAHALANOBIS DISTANCES (CHI-SQUARE S) FROM EACH CASE TO THE CENTROID OF ALL CASES FOR THE ORIGINAL DATA ( 19 D.F.) FACTOR SCORES ( 5 D.F.) AND THEIR DIFFERENCE ( 14 D.F.). EACH CHI-SQUARE HAS BEEN DIVIDED BY ITS DEGREES OF FREEDOM.

CASE LABEL	CHISQ/DF	19	5	14	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
251	3.174	3.485	3.062	2.603	-1.277	2.421	-1.562	1.690	
252	4.075	4.693	3.854	3.222	-1.770	2.907	-1.202	.225	
253	4.291	5.545	3.843	3.325	-.808	1.463	-1.436	3.437	
254	5.009	1.287	6.338	-.037	-1.869	1.647	-.232	.417	
255	-.606	1.000	.465	-1.181	-.570	.960	-1.151	1.015	
256	-.507	-.597	.507	-.644	-.342	-1.398	-.103	-.191	
257	-.344	-.229	-.386	-.226	-.228	-1.011	-.077	-.113	
258	-.368	-.474	-.330	-.469	-.302	-1.327	-.489	-.242	
259	-.157	-.194	-.144	-.240	-.073	-.931	-.132	-.161	
260	-.208	-.215	-.206	-.628	-.359	-.500	-.404	-.374	
261	-.658	-.607	-.676	-.996	-.083	-1.179	1.267	-.632	
262	-.448	-.362	-.478	1.201	-.536	-.145	-.238	-.049	
263	-.730	1.124	-.590	2.224	-.308	-.667	-.314	-.192	
264	-.522	1.033	-.340	2.018	-.478	-.645	-.511	-.436	
265	-.467	-.403	-.490	1.242	-.256	-.505	-.354	-.166	
266	-.113	-.157	-.105	1.133	-.497	-.713	-.001	-.087	
267	-.475	-.391	-.505	1.233	-.354	-.043	-.553	-.033	
268	-.545	-.676	-.498	1.374	-.191	-.684	-.858	-.502	
269	-.679	-.079	-.894	-.147	-.322	-.395	-.316	-.112	
270	-.765	-.635	-.811	-.332	1.166	-.232	1.190	-.487	
271	-.981	-.110	1.292	-.277	-.683	-.065	-.047	-.054	
272	2.620	3.028	2.475	-.520	1.285	1.273	-3.386	-.364	
273	1.669	1.043	1.893	-.396	1.453	-.527	1.345	-.926	
274	1.970	-.707	2.421	-1.055	-.183	1.443	-.252	-.490	
275	1.493	-.391	1.886	-.046	-.509	1.205	-.403	-.282	
276	1.309	1.366	1.288	-.334	2.158	-.190	1.391	-.305	
277	-.390	-.595	-.317	-1.423	-.316	-.062	-.915	-.090	
278	-.331	-.226	-.368	-.076	-.784	-.627	-.331	-.093	
279	-.560	-.177	-.696	-.368	-.717	-.246	-.345	-.239	
280	-.224	-.144	-.253	-.202	-.645	-.352	-.087	-.365	
281	-.737	-.791	-.717	1.320	-.485	-.083	-1.382	-.250	
282	-.275	-.067	-.349	-.212	-.290	-.024	-.384	-.240	
283	1.945	1.139	2.232	-.024	-.560	2.148	-.844	-.235	
284	2.973	1.920	3.355	2.639	1.017	-.329	1.222	-.016	
285	15.564	46.091	4.662	-1.289	-.128	-4.493	2.058	14.295	
286	7.228	4.785	8.101	2.646	-.906	2.372	3.083	.987	
287	1.089	-.949	1.139	1.054	1.406	-.588	-.030	-1.145	
288	3.070	1.320	3.695	-.504	-.578	-.691	1.933	1.341	
289	-.646	-.434	-.721	-.661	-.440	-.959	-.700	-.359	
290	-.359	-.150	-.433	-.190	-.002	-.420	-.396	-.619	
291	-.187	-.112	-.213	-.045	-.557	-.470	-.156	-.014	
292	-.555	-.600	-.539	-.565	-1.002	1.251	-.271	-.203	
293	-.655	-.300	-.782	-.611	-.836	-.615	-.112	-.194	
294	-.196	-.270	-.170	-.656	-.469	-.820	-.169	-.009	
295	-.341	-.192	-.394	-.474	-.521	-.381	-.321	-.464	
296	-.463	-.730	-.368	-.633	-.282	-1.585	-.812	-.004	
297	6.640	10.255	5.348	1.839	-.174	-.147	-6.805	1.240	
298	1.889	-.371	2.431	-.732	-.737	-.516	-.649	-.296	
299	-.776	1.044	-.681	-.085	-.624	1.903	-.965	-.519	
300	-.548	-.712	-.489	-.224	-.227	-.536	1.465	-1.013	

ESTIMATED FACTOR SCORES AND MAHALANOBIS DISTANCES (CHI-SQUARE S) FROM EACH CASE TO THE CENTROID OF ALL CASES FOR THE ORIGINAL DATA (19 D.F.) FACTOR SCORES (5 D.F.) AND THEIR DIFFERENCE (14 D.F.). EACH CHI-SQUARE HAS BEEN DIVIDED BY ITS DEGREES OF FREEDOM.

CASE LABEL	CHISQ/DF 19	CHISQ/DF 5	CHISQ/DF 14	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
301	2.355	3.148	2.071	-.075	2.506	1.970	2.320	.438
302	.629	.842	.553	-.624	-.551	1.616	-.407	-.859
303	.515	.815	.409	-1.406	-.100	.986	-.785	.706
304	.146	.233	.115	-.789	-.220	.298	-.334	-.543
305	.350	.212	.399	-.916	-.363	-.005	-.184	.235
306	.442	.310	.489	-1.025	-.119	-.481	.374	-.339
307	.768	1.408	.543	-2.017	-.496	-1.021	.859	-.975
308	.454	.519	.431	-1.284	-.210	.879	.314	.171
309	.298	.158	.348	.026	-.252	-.520	.509	-.442
310	.525	.268	.617	.352	-.733	.675	.053	-.469
311	.540	.176	.670	.305	-.307	.046	.543	-.628
312	.264	.505	.178	-1.193	-.468	-.769	.400	-.361
313	.400	.551	.346	-1.324	-.471	-.451	.490	-.580
314	.487	.677	.420	-1.725	-.340	.009	.516	-.157
315	.746	.798	.727	1.445	.326	-1.241	.506	.025
316	.628	.523	.665	1.389	.161	-.463	.209	.634
317	1.163	1.373	1.087	.596	1.238	1.023	1.369	1.435
318	.463	.462	.463	.672	.211	.550	1.082	-.187
319	.334	.126	.408	-.070	-.181	-.204	.670	.321
320	.380	.249	.426	.708	-.566	-.583	-.288	-.014
321	.227	.215	.233	-.270	-.270	-1.065	.102	-.188
322	.591	1.029	.434	-.424	.374	1.434	1.422	-.865
323	.781	.513	.876	-.700	.011	1.347	.388	-.331
324	.425	.488	.403	-1.225	-.408	.616	-.379	.498
325	.510	.829	.597	-1.753	-.199	-.594	-.128	.813
326	.330	.463	.283	-1.452	-.304	.155	-.294	.027
327	.459	.416	.474	-1.013	-.163	-.433	.591	-.700
328	.582	1.150	.379	-1.850	-.031	-.718	1.053	-.839
329	.251	.112	.301	-.333	-.387	.272	-.131	-.454
330	.545	.372	.606	-.906	-.823	.158	-.553	-.178
331	.684	.435	.773	-1.090	-.379	.642	-.574	.321
332	.445	.161	.546	.586	-.459	-.396	-.035	-.305
333	.365	.271	.399	-1.073	-.166	-.144	-.326	-.326
334	.248	.353	.210	-1.144	-.532	.411	-.028	-.045
335	.312	.255	.333	-.813	-.410	-.331	-.366	-.366
336	.533	.166	.664	.724	-.190	.072	.319	-.403
337	.407	.298	.445	-.763	-.483	-.811	-.083	-.103
338	.292	.320	.282	-.179	-.438	-1.153	.185	-.105
339	.321	.748	.168	1.466	-.466	-1.079	-.454	-.074
340	.467	.720	.377	1.117	-.092	-1.525	.119	-.026
341	.602	.336	.697	-.607	-.179	-.817	.404	-.671
342	.692	.309	.829	-.472	-.271	-.590	.355	-.880
343	.640	.256	.777	-.157	-.404	-.324	-.992	-.016
344	.568	.584	.562	-.180	-.175	-.061	-.751	1.514
345	.507	.560	.488	-.161	-.203	-1.452	-.786	-.097
346	.669	.457	.745	.868	-.368	-.515	-1.051	.161
347	.491	.285	.564	.348	-.017	-1.014	-.391	.348
348	1.097	1.271	1.035	-.056	-.636	-.381	-1.135	2.124
349	1.471	1.579	1.790	.234	-.874	-1.250	-.707	-.122
350	.474	.389	.505	-.705	-.516	1.014	-.374	-.111

ESTIMATED FACTOR SCORES AND MAHALANOBIS DISTANCES (CHI-SQUARE S) FROM EACH CASE TO THE CENTROID OF ALL CASES FOR THE ORIGINAL DATA (19 D.F.) FACTOR SCORES (5 D.F.) AND THEIR DIFFERENCE (14 D.F.). EACH CHI-SQUARE HAS BEEN DIVIDED BY ITS DEGREES OF FREEDOM.

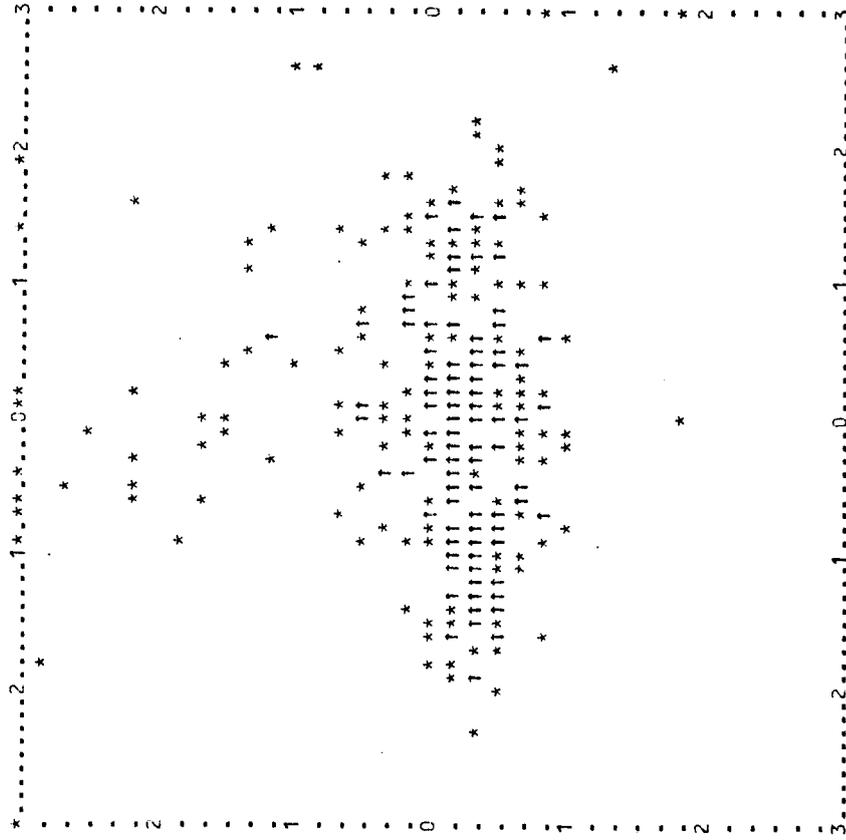
CASE LABEL	NO.	CHISQ/DF	CHISQ/DF	CHISQ/DF	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
351	19	1.444	1.09	1.921	-.479	-.277	-.250	-.072	.411
352	14	.985	.094	1.303	-.377	-.220	.100	-.417	-.312
353	5	.465	.475	.462	-1.485	-.247	-.072	.145	-.288
354	19	.899	.801	.934	-.712	-.253	1.847	-.041	-.141
355	14	.628	.399	.709	-.012	-.307	1.129	.293	-.736

FACTOR SCORE COVARIANCE (COMPUTED FROM FACTOR SCORES)

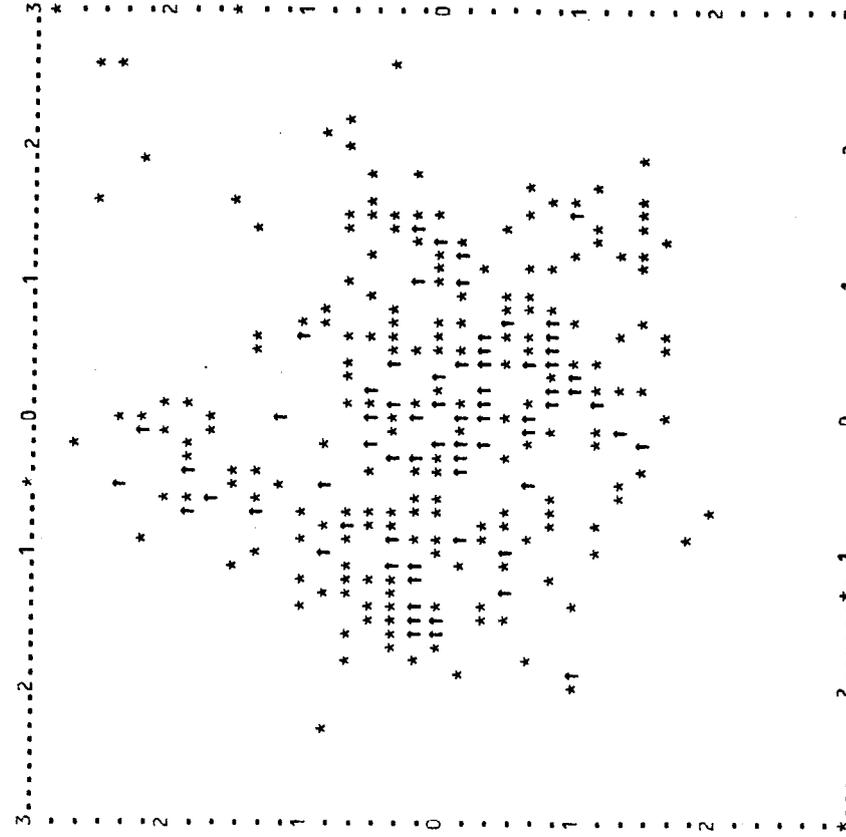
	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.000				
FACTOR 2	.000	1.000			
FACTOR 3	.000	.000	1.000		
FACTOR 4	.000	.000	.000	1.000	
FACTOR 5	.000	.000	.000	.000	1.000

FACTOR SCORES

X-AXIS IS FACTOR 1, Y-AXIS IS FACTOR 2



X-AXIS IS FACTOR 1, Y-AXIS IS FACTOR 3



OVERLAP IS INDICATED BY A DOLLAR SIGN. SCALE IS FROM -3 TO +3.  
FACTOR SCORES GREATER THAN 3 ARE PLOTTED AS 3.  
FACTOR SCORES LESS THAN -3 ARE PLOTTED AS -3.



PAGE 27 BMDP4M

BMDP4M - FACTOR ANALYSIS

NO MORE CONTROL LANGUAGE.

PROGRAM TERMINATED

RUNID: 25083 ACCT: TM2001K PROJECT: 25083

25083D FIN

TIME: TOTAL: 00:00:59.911 CBSUPS: 041292385

CPU: 00:00:18.921 I/O: 00:00:16.298

CC/ER: 00:00:04.690 WAIT: 00:00:01.000

IMAGES READ: 1081 PAGES: 29

START: 22:10:44 APR 10,1986 FIN: 22:11:14 APR 10,1986

SPERRY 1100 TIME/SHARING EXEC --- MULTI-PROCESSOR SYSTEM --- LEV. 39R3B.015 SITE \* RUNIT

APPENDIX E.

## E.1 DETAILED LOGS OF FIFTEEN SURFACE DIAMOND DRILL HOLES (DDH).

Detailed logs of 15 surface drill holes which were described and sampled in connection with a detailed lithogeochemical analyses program.

## E.1.1 The following DDH's have been logged and sampled:

D7, D10, D18, D31, D32, D36, D39, D52, D59, D61, D62, D63, D64, D65, and 2027.

The logs are presented in 1:500 scale (detailed logging of the D39 test hole was done on a 1:250 scale).

The sample numbers, interval length for each sample and the number of composite samples for each 10 m interval sample is given on left hand side.

The rock type information given for each sample refers to an interpretation of the chemical data on the basis of the chemical character of the host rock lithologies and distal greenstone types separated out for this report.

Group A: Pre-ore massive volcanites.

Group B: Pre-ore pillowed volcanites.

Group C: Post-ore volcanites, C<sub>1</sub> - pillowed, C<sub>2</sub> - laminated volcaniclastic.

Group D: Distal greenstones.

## Joma Pre-Ore Host Rock Types:

- B<sub>1</sub>: undifferentiated volcanites, pillowed sequence.  
 B<sub>2</sub>: pale, po bearing, Ab + ser. schists.  
 B<sub>3</sub>: Moderate grey-green, po bearing Ab + chl schists.  
 B<sub>4</sub>: pale, py bearing, ser + chl + act schists.  
 B<sub>5</sub>: pale albitite + pyrite-rich rocks.  
 B<sub>6</sub>: dark chlorite schists.

(For further information, see text for description of units, Section 2 and 4, and Tables 4.1 and Fig. 4.7.)

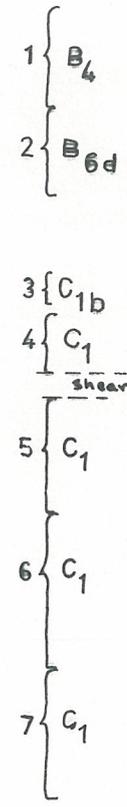
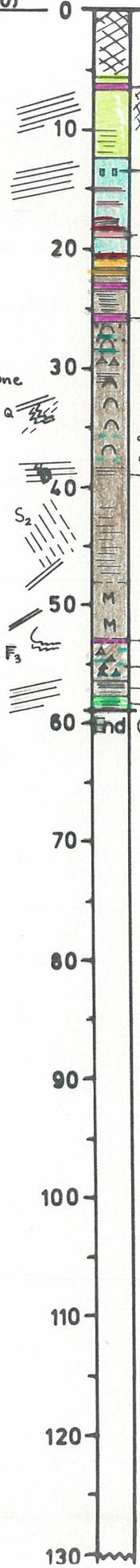
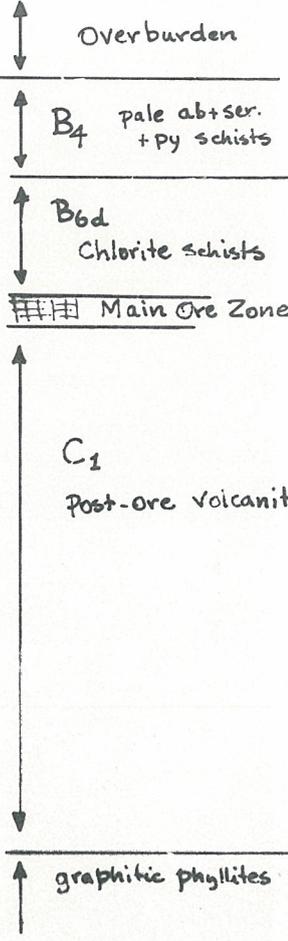
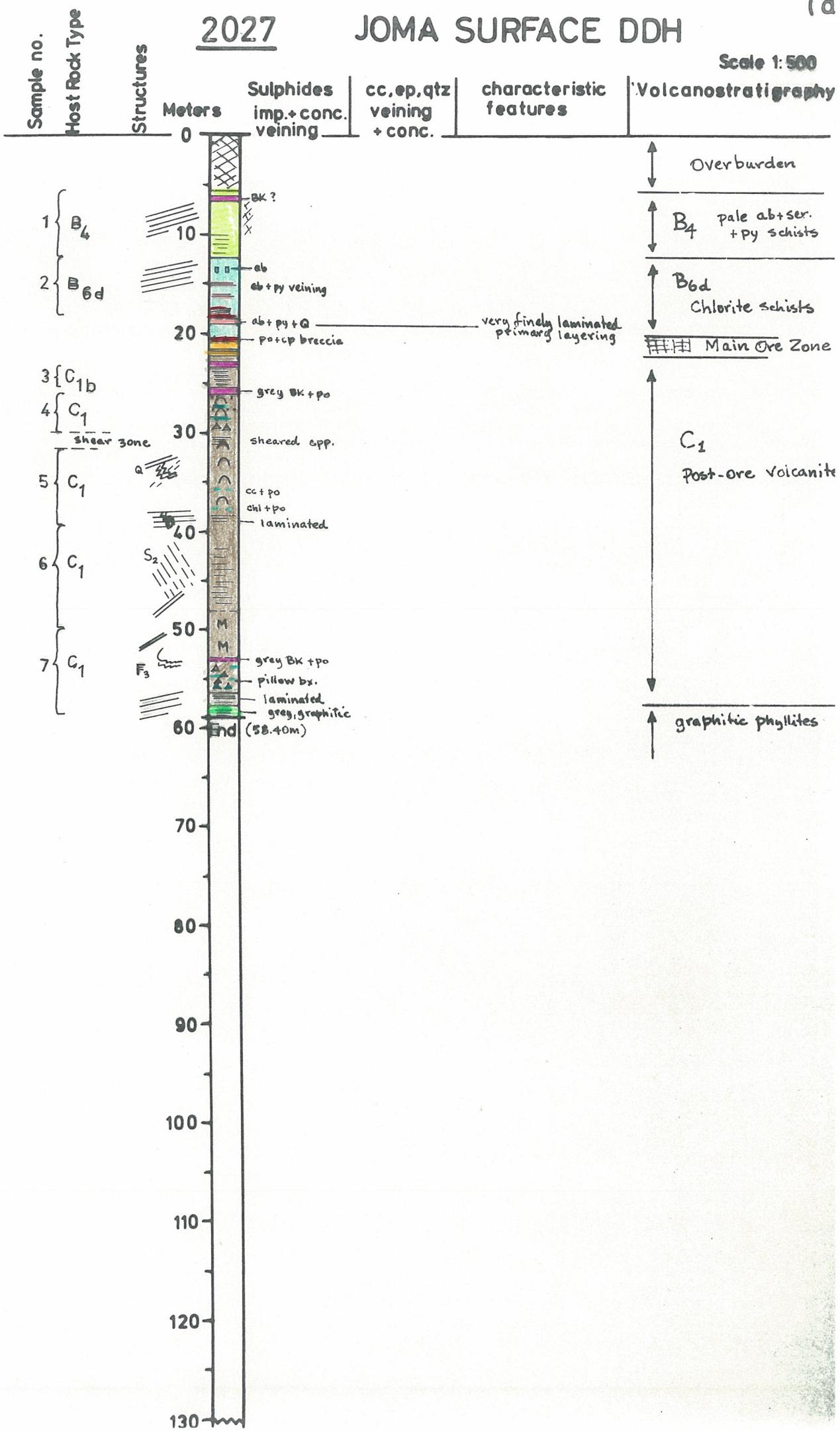
## E.1.2: Symbols and Abbreviations used in Diamond Drill Hole (DDH) logs:

- 00   = pillows (cpp = close packed pillows)  
 Δ Δ = breccia structures (pbx = pillow breccias)  
 H = Hyaloclastites  
 M = Massive volcanites  
 . = amygdales  
 + = medium to coarse grained crystalline igneous texture  
 G = coarse grained gabbroic texture  
 f.gr. = fine grained  
 m.gr. = medium grained  
 c.gr. = coarse grained  
 = fine layers, laminations  
 = porphyroblastic texture, feldspar or white mica  
 = actinolite needles  
 BK = Blåkvarts or dark mt-bearing recrystallized cherty exhalite  
 QF = Layered quartz-phyllite  
 GF = graphitic phyllite  
 graf = graphite  
 po = pyrrhotite  
 py = pyrite  
 sl = sphalerite  
 mt = magnetite  
 ep = epidote  
 cc = calcite, carbonate  
 Q = quartz

2027

# JOMA SURFACE DDH

Scale 1:500



Sulphides imp.+ conc. veining

cc, ep, qtz veining + conc.

characteristic features

Volcanostratigraphy

Meters

Structures

B<sub>4</sub>

B<sub>6d</sub>

C<sub>1b</sub>

C<sub>1</sub>

C<sub>1</sub>

C<sub>1</sub>

C<sub>1</sub>

shear zone

a

S<sub>2</sub>

F<sub>3</sub>

BK?

ab

ab+py veining

ab+py+Q

po+cp breccia

grey BK+po

sheared spp.

cc+po

chi+po

laminated

grey BK+po

pillow bx.

laminated grey, graphitic

End (58.40m)

very finely laminated primary layering

Overburden

B<sub>4</sub> pale ab+ser. + py schists

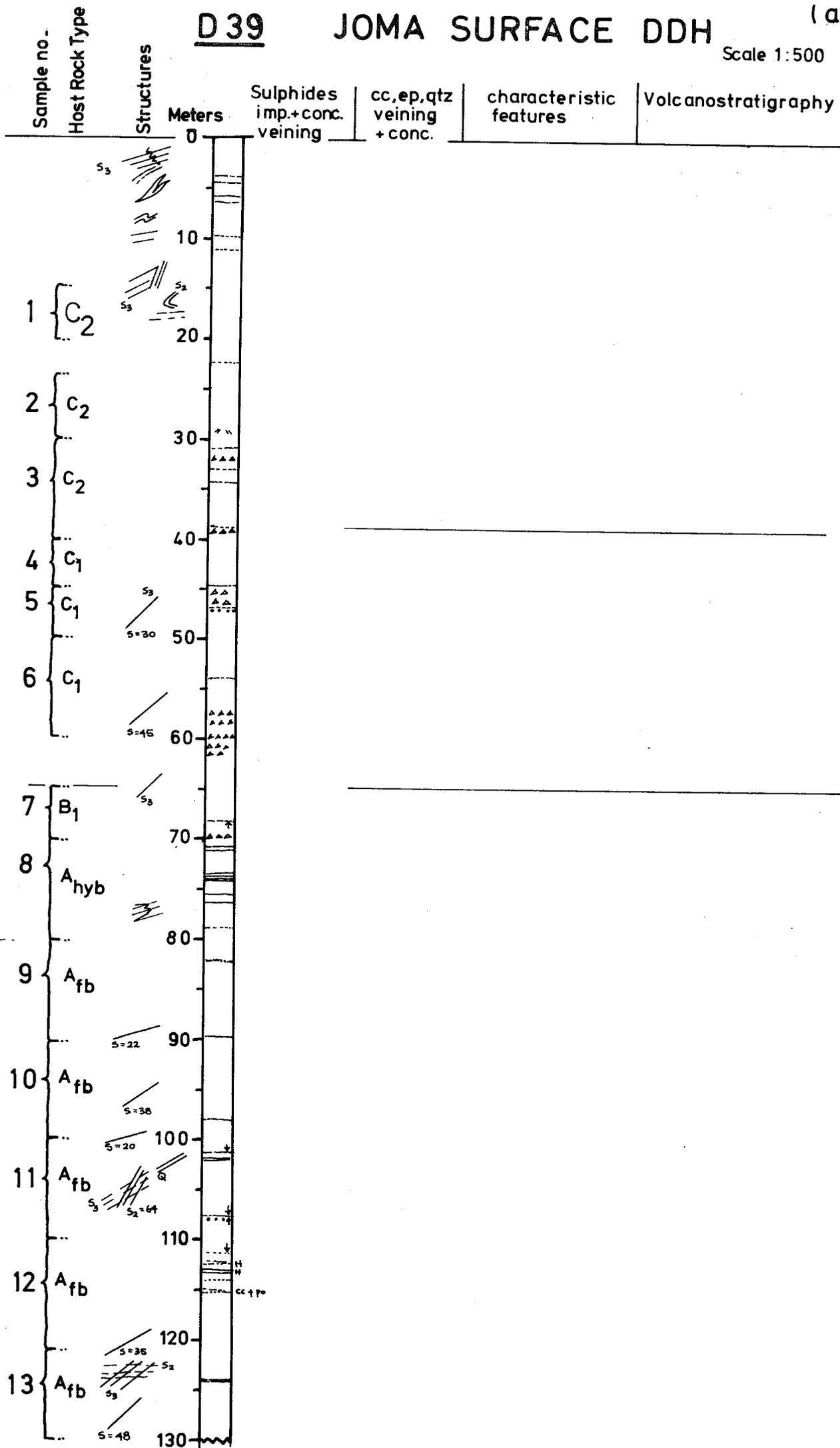
B<sub>6d</sub> Chlorite schists

Main Ore Zone

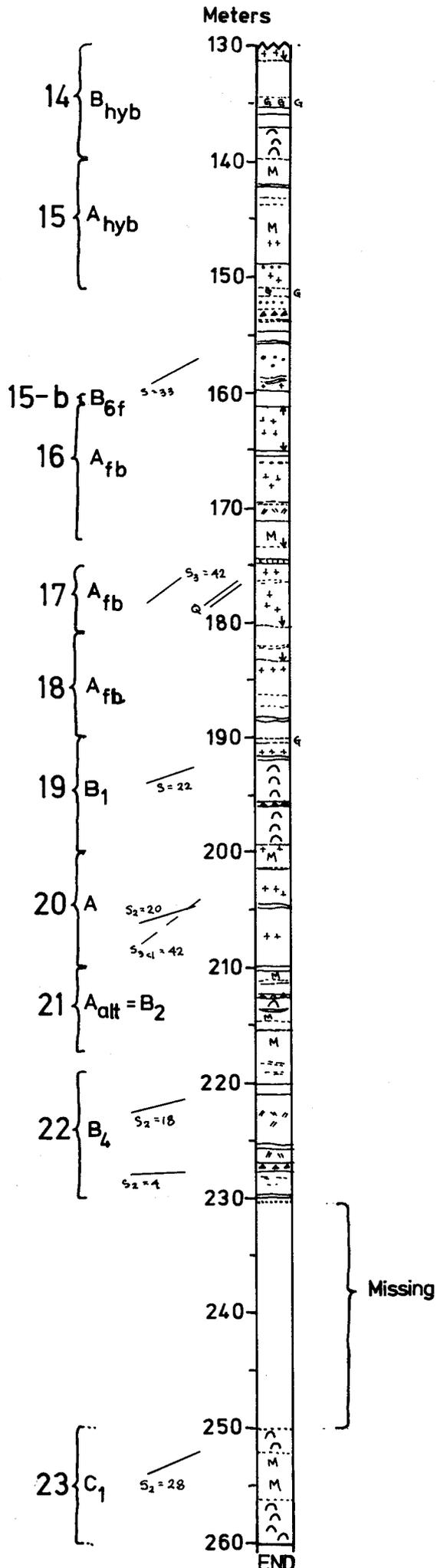
C<sub>1</sub>

Post-ore volcanite

graphitic phyllites



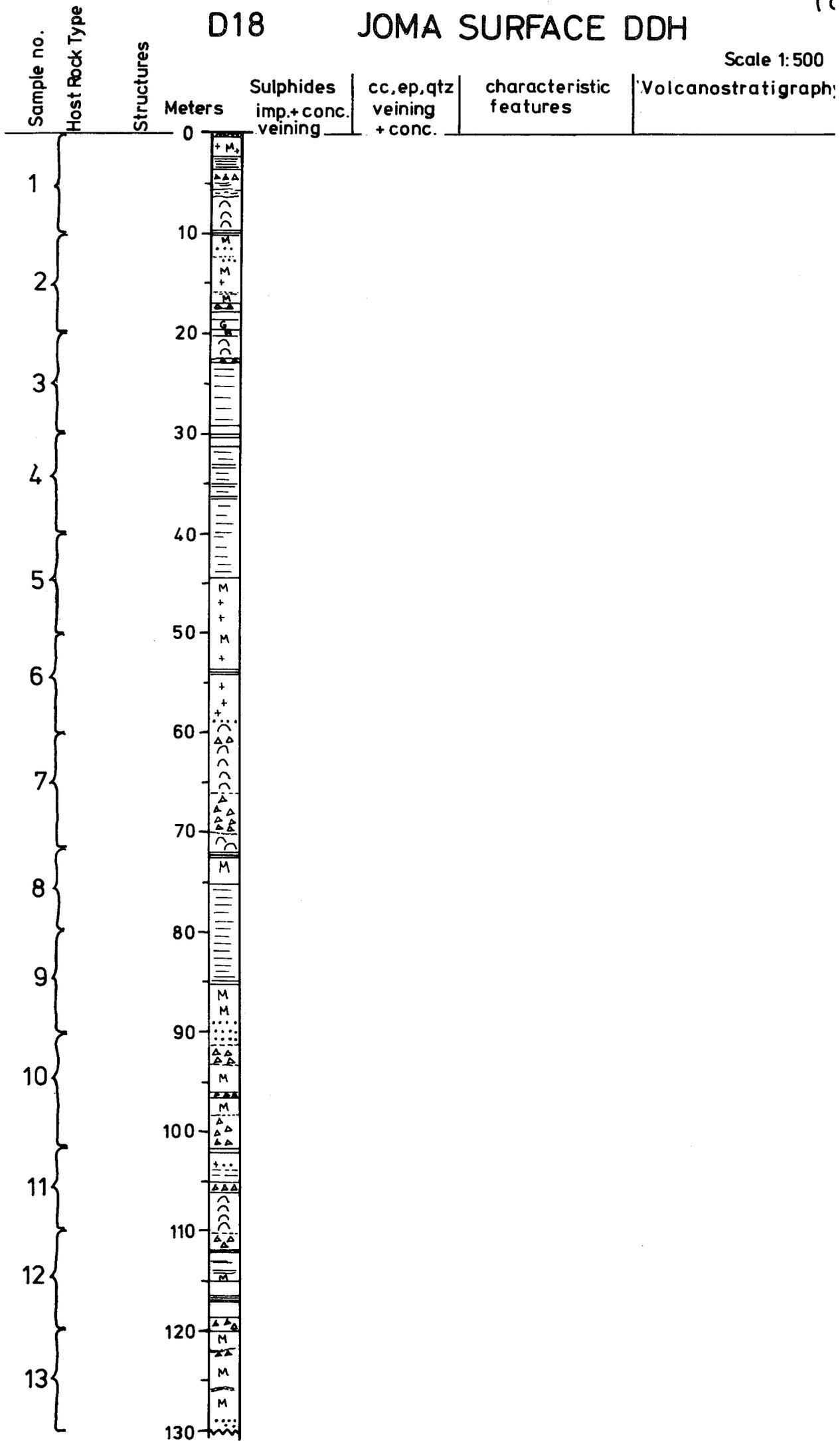
# D 39

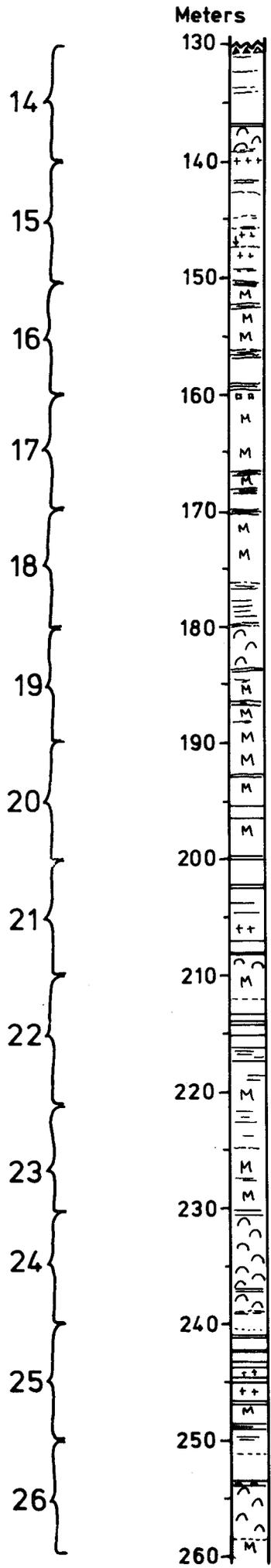


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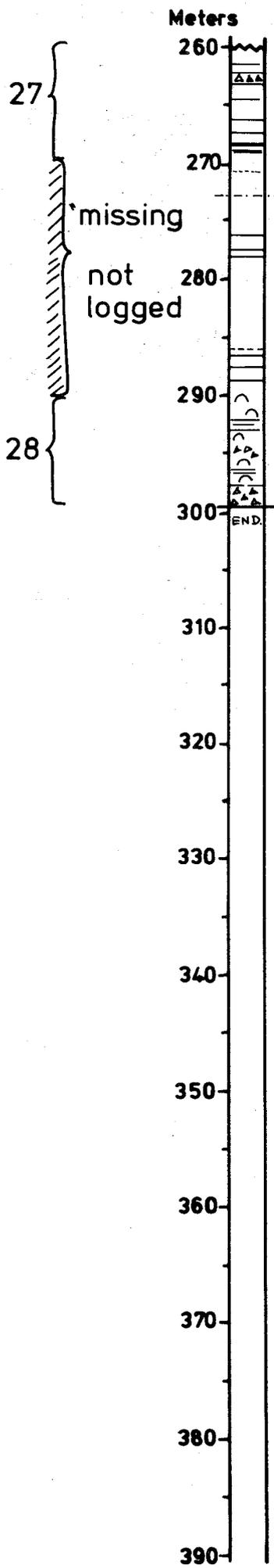
# JOMA SURFACE DDH

Scale 1:500





# D18



APPENDIX F.F.1 TWENTY-EIGHT VERTICAL GEOLOGICAL PROFILES FROM B<sub>1</sub>, B<sub>2</sub>, Y AND X MINE PROFILE SERIES (SCALE 1:500).

(Listed in order as given below, from East to West and North to South.)

## PROFILES:

B<sub>1</sub> - 3  
 - 5  
 - 8  
 - 9  
 - 11

B<sub>2</sub> - 3  
 - 7  
 - 9  
 - 11  
 - 13  
 - 15  
 - 17  
 - 19

Y 31320  
 31360  
 31400  
 31480

X 95280  
 95200  
 95160  
 95120  
 95080  
 95000  
 94960  
 94900  
 94840  
 94760

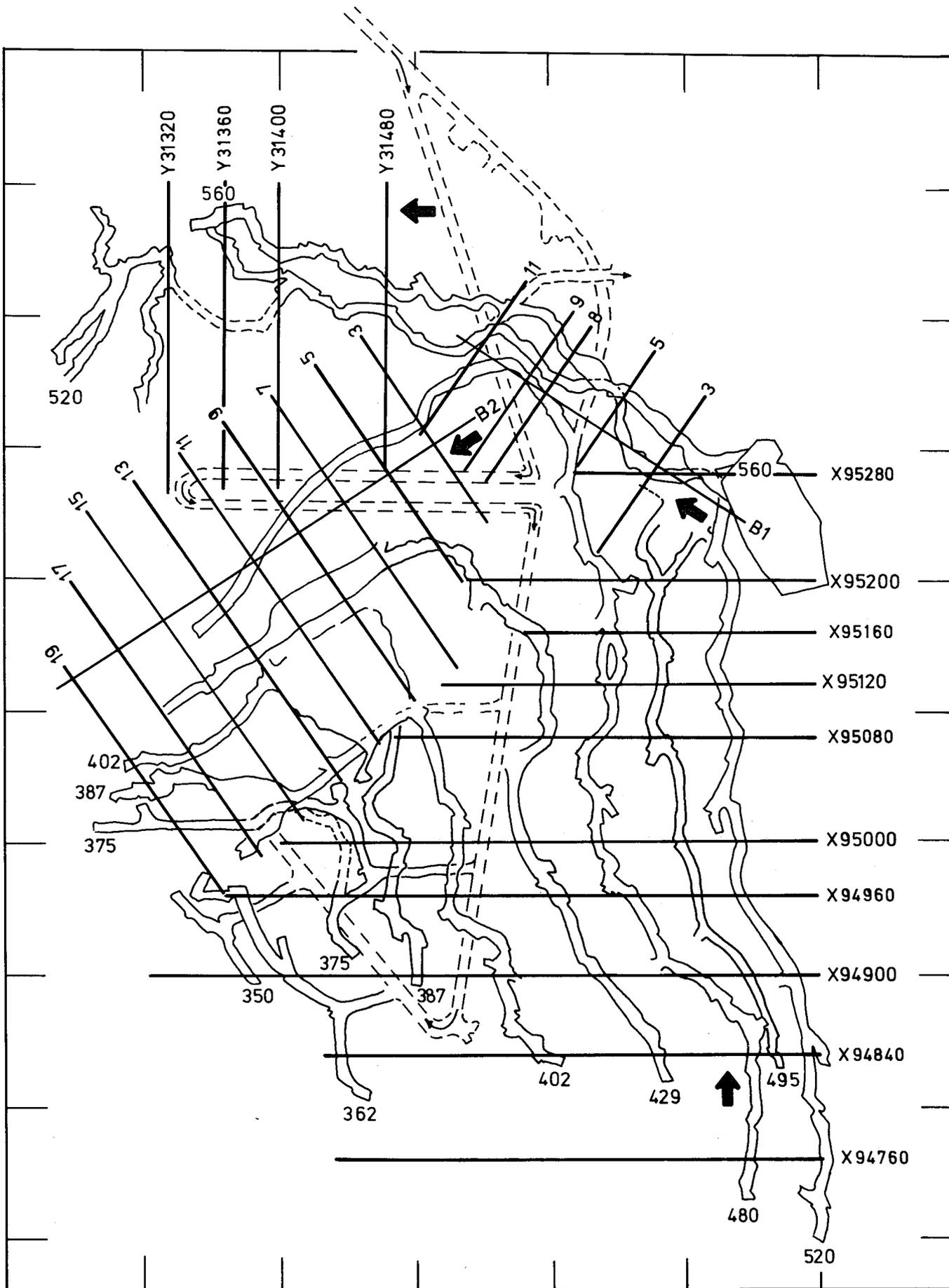
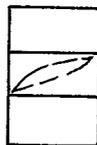


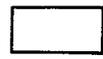
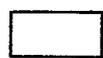
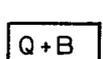
Diagram showing distribution of the vertical profiles from the Joma mine. Arrows show viewing directions.

KEY TO VERTICAL GEOLOGICAL PROFILES AT JOMA

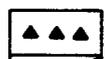
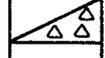
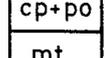
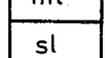
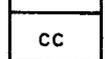
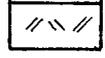
Post-Ore, Footwall Series

- |   |   |
|---|---|
|  | - Limestone-marble and carbonates.                        |
|   | - 'Blåkvarts', magnetite-bearing dark quartzites (chert). |
| C <sub>1</sub>  | - Pale, pillowed greenstone, epidote+calcite bearing.     |

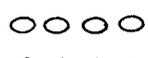
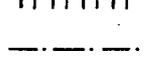
Pre-Ore, Hangingwall Host-Rock Series

- |   |                |   |
|---|----------------|---|
|    | B <sub>1</sub> | - Moderate-green, undifferentiated, pillowed + massive greenstones, Fe-chlorite+epidote+po-impreg.-bearing. |
|    | B <sub>3</sub> | - Moderate-green, Fe-chlorite+albite rich greenstone, po-dissem.  |
|    | B <sub>4</sub> | - Pale, albite+chlorite+sericite schists, py-bearing /+actinolite bearing, porphyroblastic.                 |
|    | B <sub>5</sub> | - Albitite + pyrite rich rock.  |
|    | B <sub>6</sub> | - Dark, Fe-chlorite schist, cp-po bearing.  |
|  |                | - Layered dark chlorite schists and pale albitite+pyrite rocks.   |
|  |                | - Quartz+albite+Fe-chlorite+biotite rich rocks, with strong cp+po mineralization.                           |

Ore Types

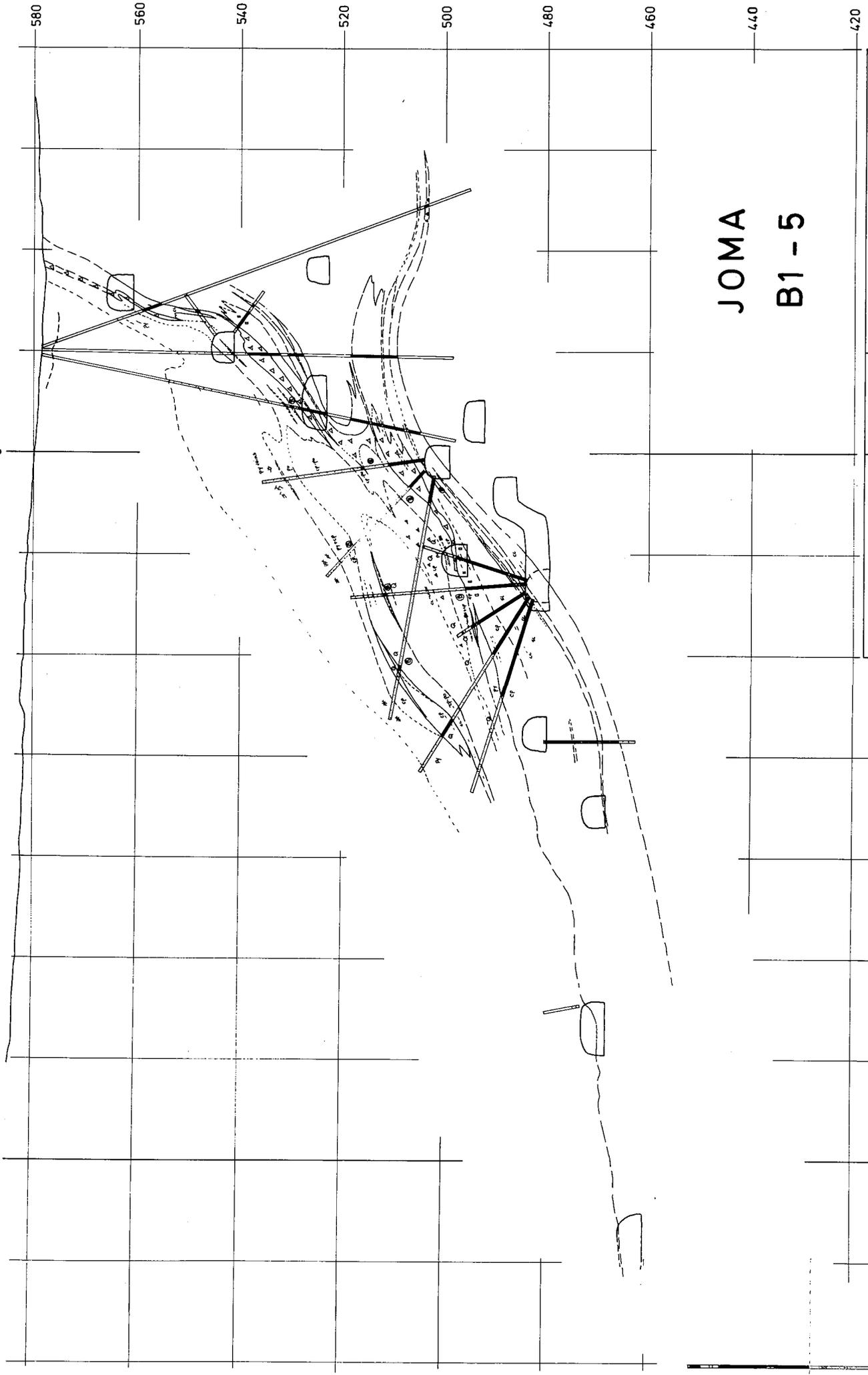
- |   |                   |   |
|---|-------------------|---|
|  | III               | - Chalcopyrite+pyrrhotite breccia ore, Cu-rich.     |
|  | I                 | - Massive pyritic facies/pyritic brecciated type.   |
|  | II                | - Cp+po rich pyritic facies, Cu-rich.               |
|  | II <sub>b+e</sub> | - Magnetite-bearing pyritic facies, Cu-rich.        |
|  | IV                | - Sphalerite rich pyritic facies, Zn-rich.          |
|  | IV                | - Carbonate rich pyritic ore, + limestone bands.    |
|  | IV <sub>b</sub>   | - Porphyritic amphibole-bearing pyritic ore facies. |

Structure Symbols

- |   |   |
|---|---|
|  | - Close packed pillows.   |
|  | - Pillow-breccia.   |
|  | - Hyaloclastite.  |
|  | - Minor thrust zones, D <sub>2</sub> related.                       |
|  | - Minor fault, fractures and cleavage zone, D <sub>3</sub> related. |



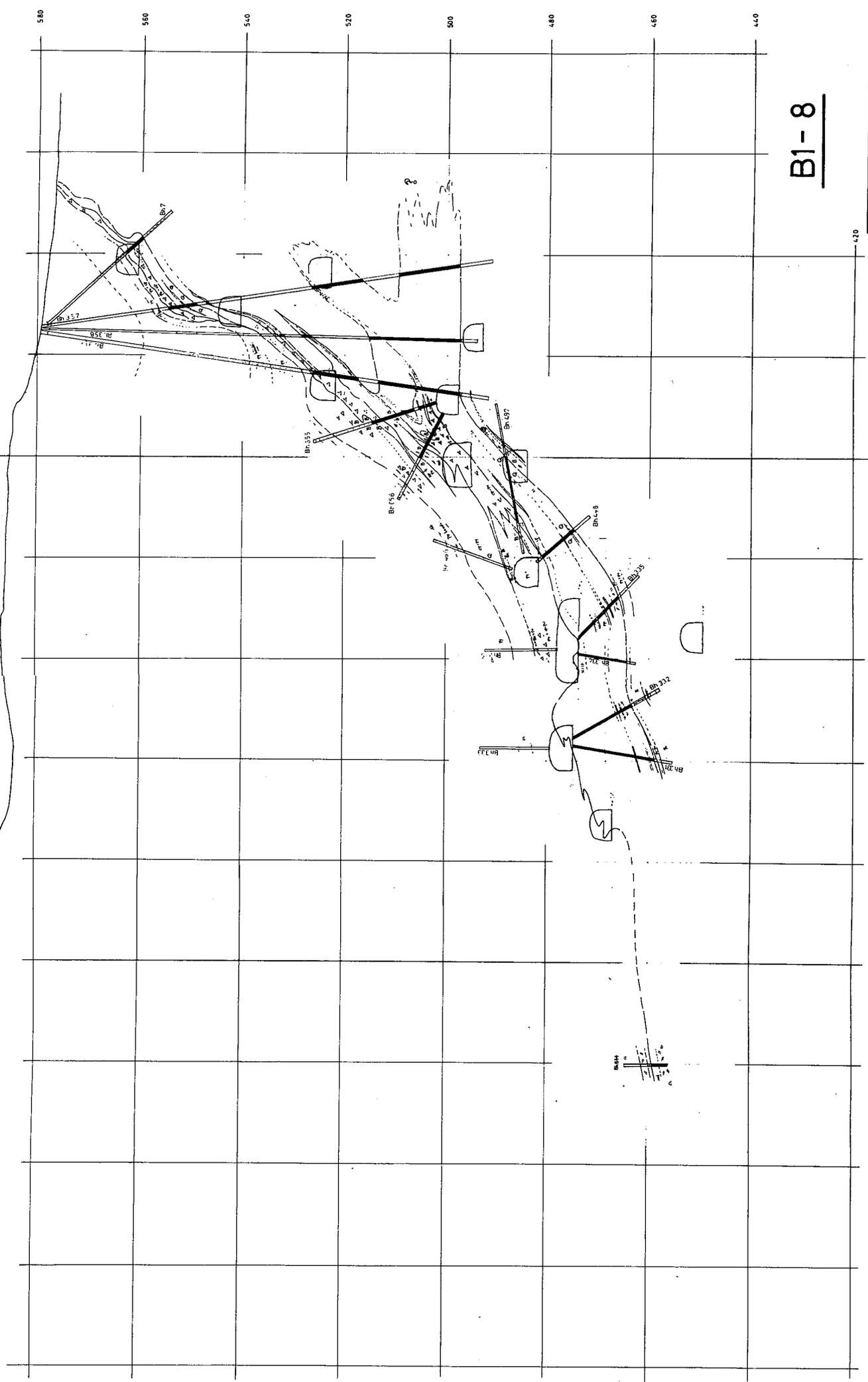
B1  
0



# JOMA B1 - 5

VERTICAL PROFILE B1 - 5	1 : 500	GRONG GRUBER A/S
	AR/86	

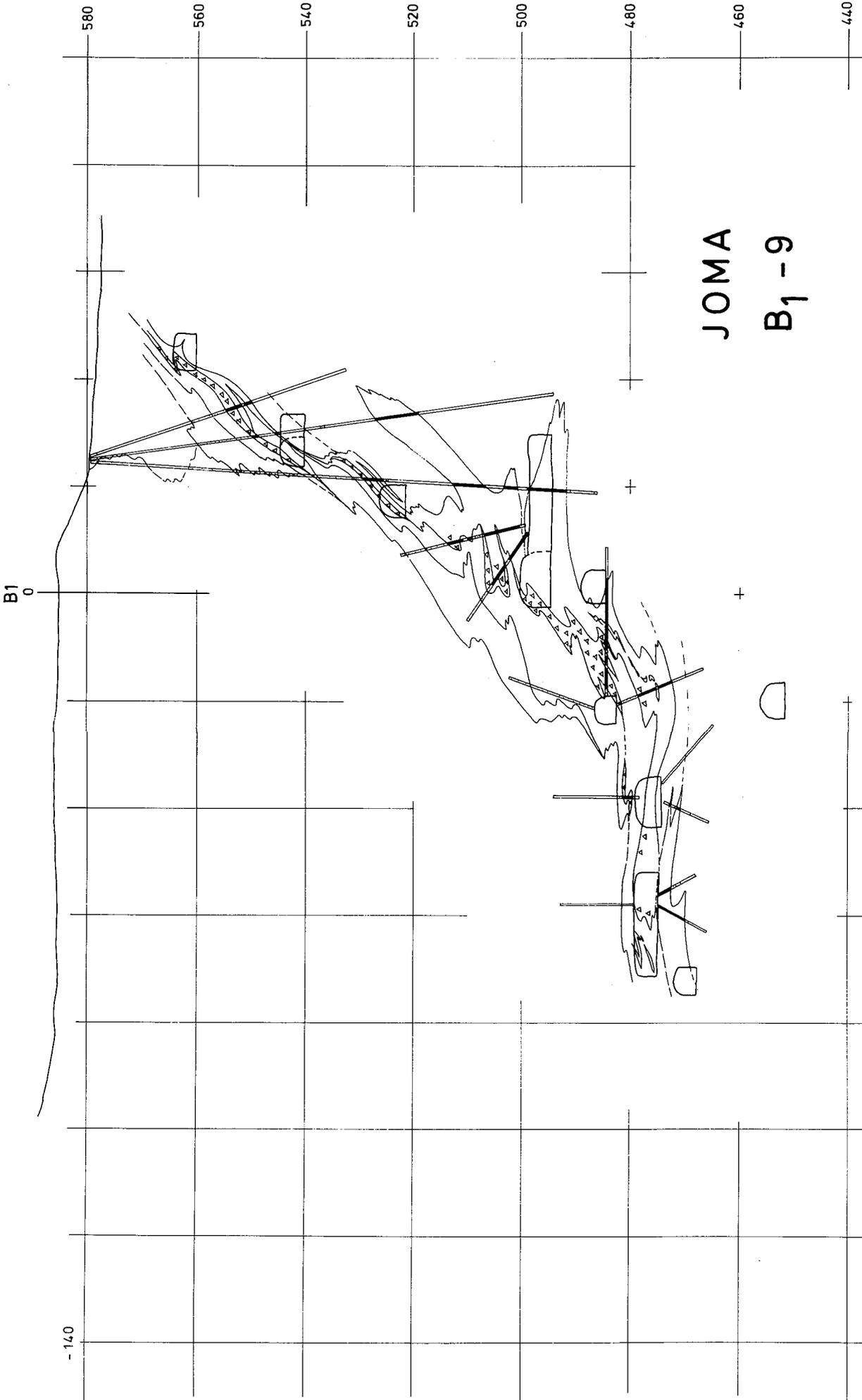
B 1



B1-8

VERTIKALPROFIL	MALEST.
SERIE: B1	1:500
GRONG GRUFRÅK	Pr. A

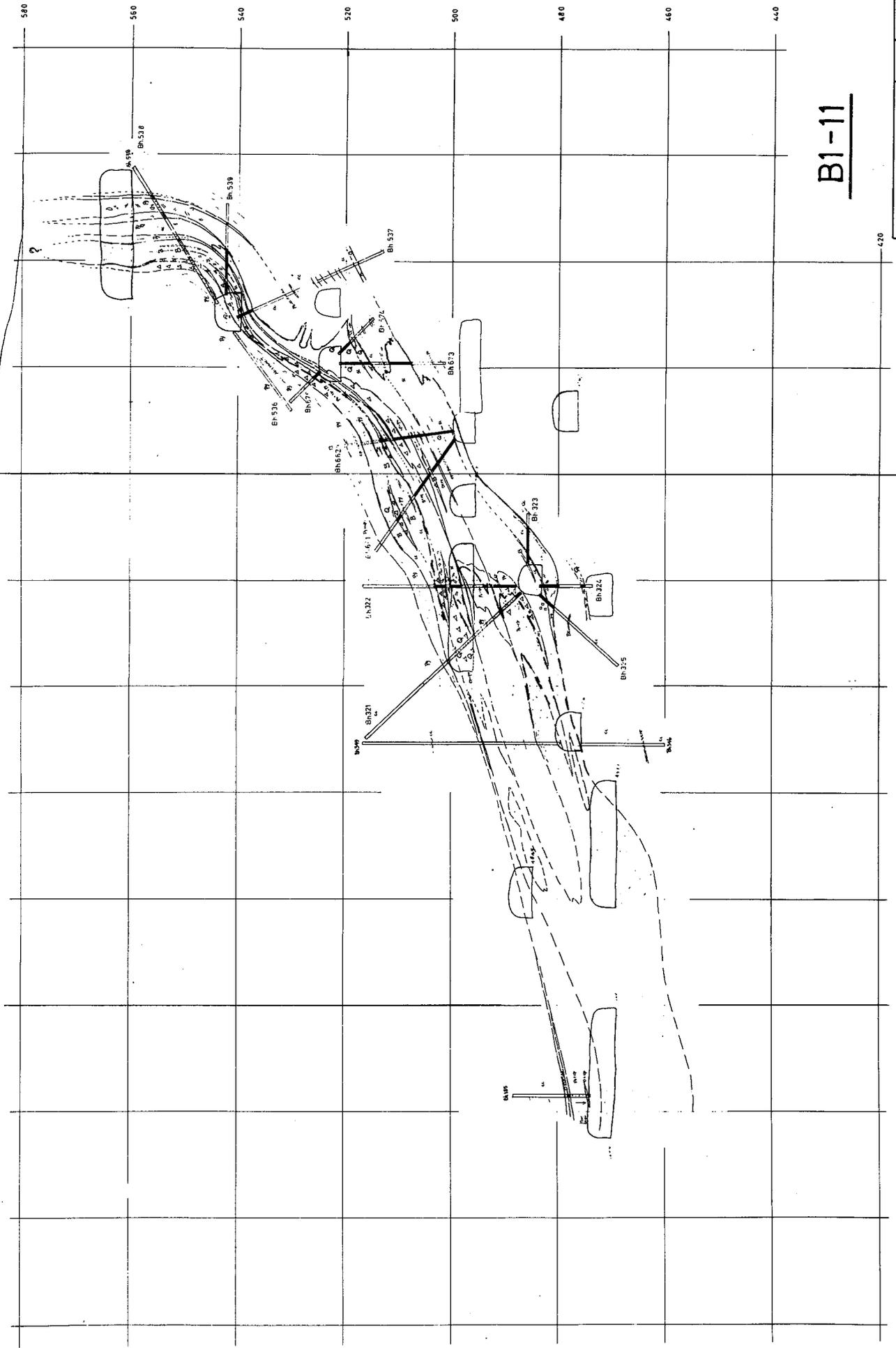
ARBT



- 140

VERTICAL PROFILE B1 - 9	1 : 500	GRONG GRUBER A/S
	JO+AR/86	

B1



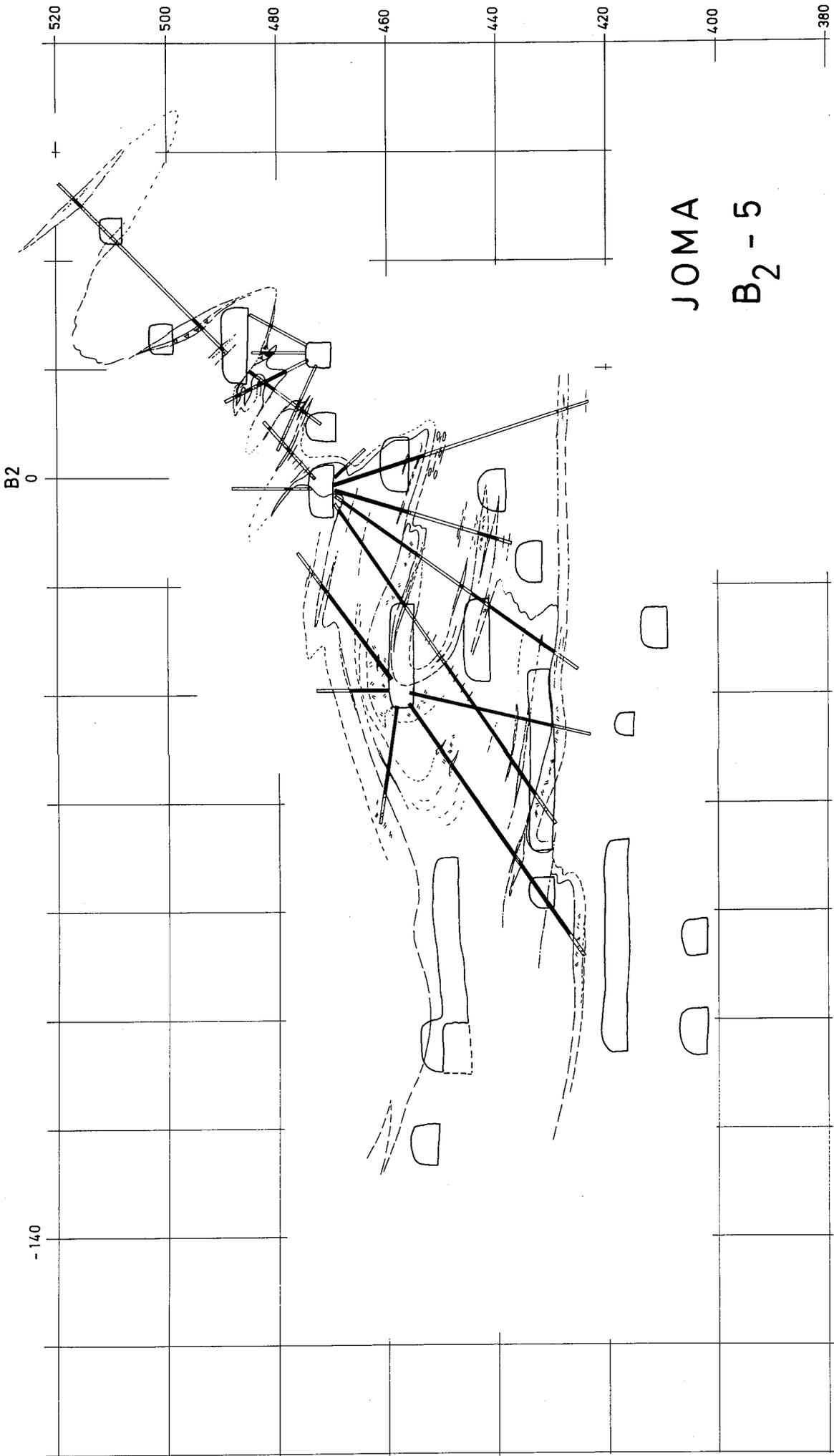
B1-11

220

VERTIKALPROFIL	MÅLEST.
SERIE: B1	1:500
GRÖNGRIPFRÅG	Pr 11

AR 84



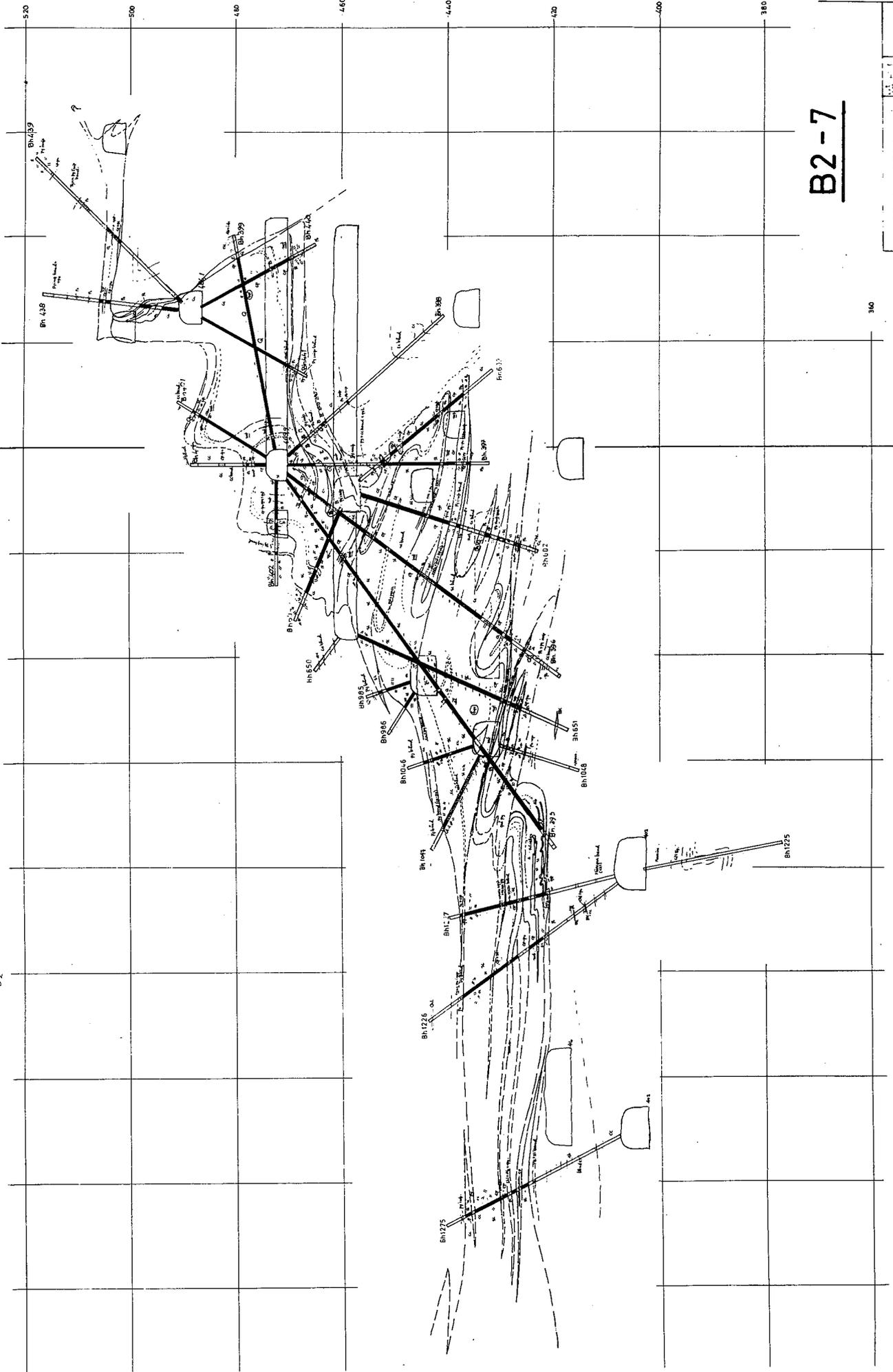


JOMA  
B<sub>2</sub> - 5

VERTICAL PROFILE B <sub>2</sub> - 5	1:500	GRONG GRUBER A/S
	AR/86	

B2

$I_s \div 100$

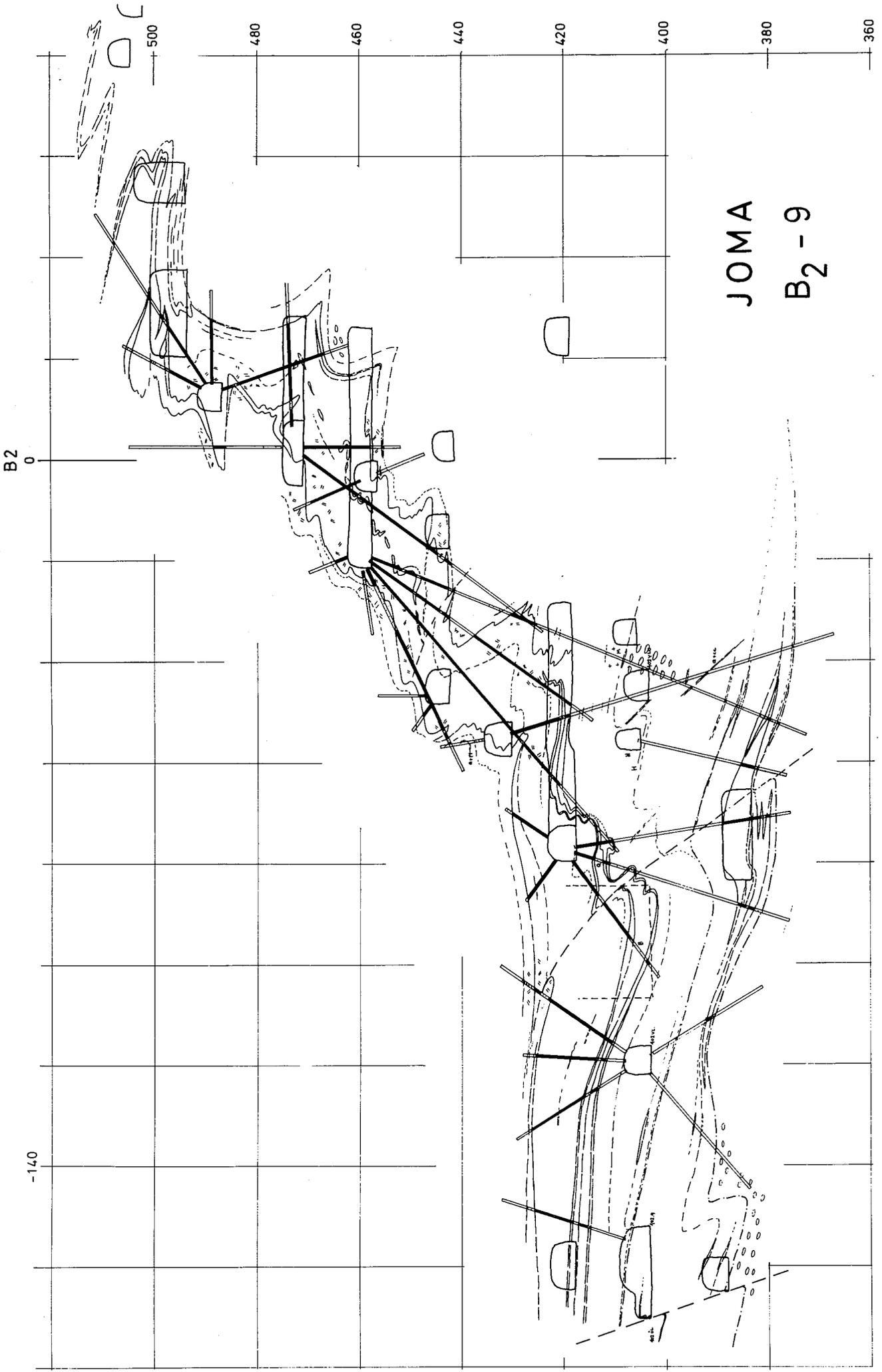


B2-7

360

VERTIKAL PROFIL	
SERIE B2	
Blatt	500

AR 84



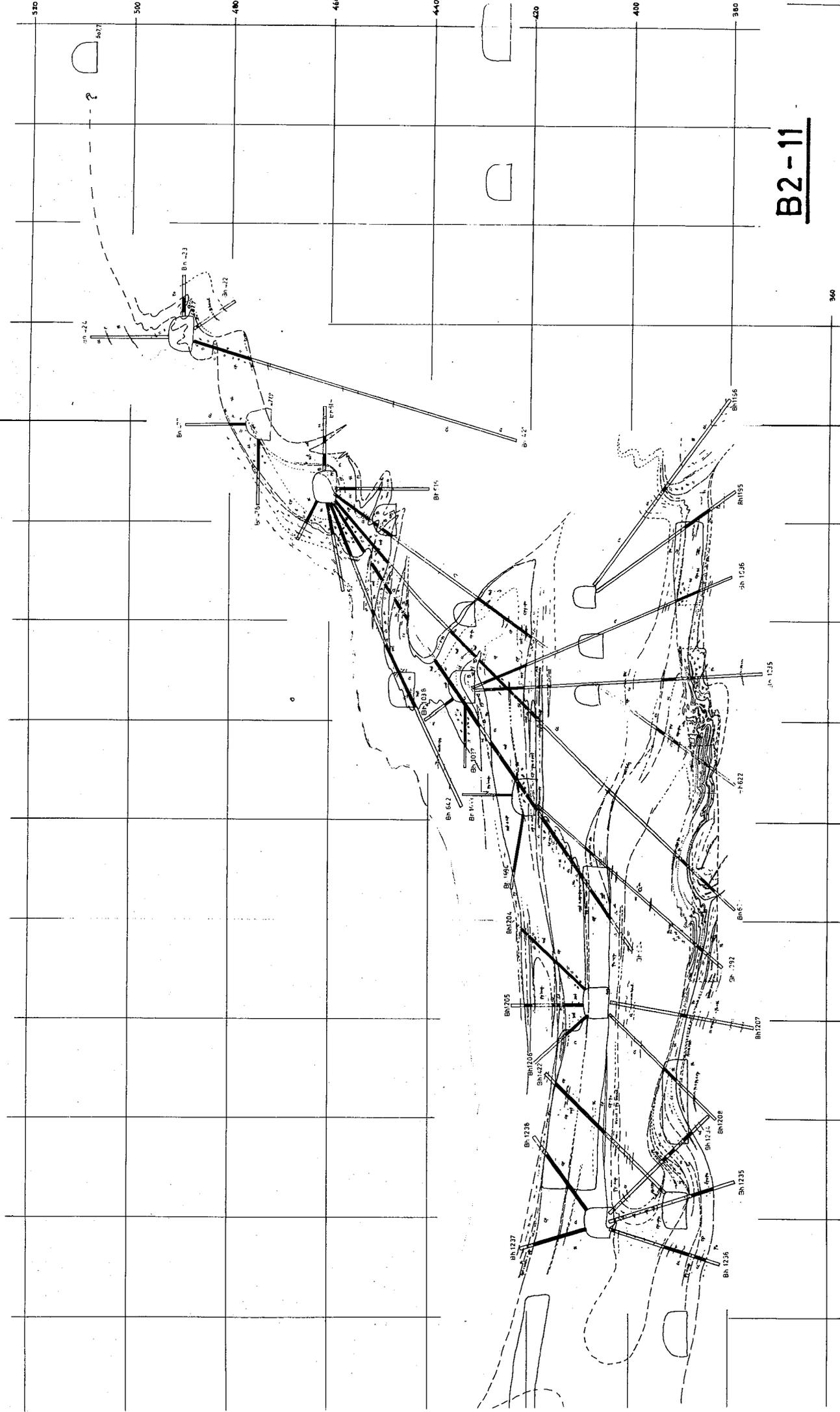
JOMA  
B2 - 9

VERTICAL PROFILE B2 = 9	1:500	GRONG GRUBER A/S
	AR/86	

SE

B2

NW

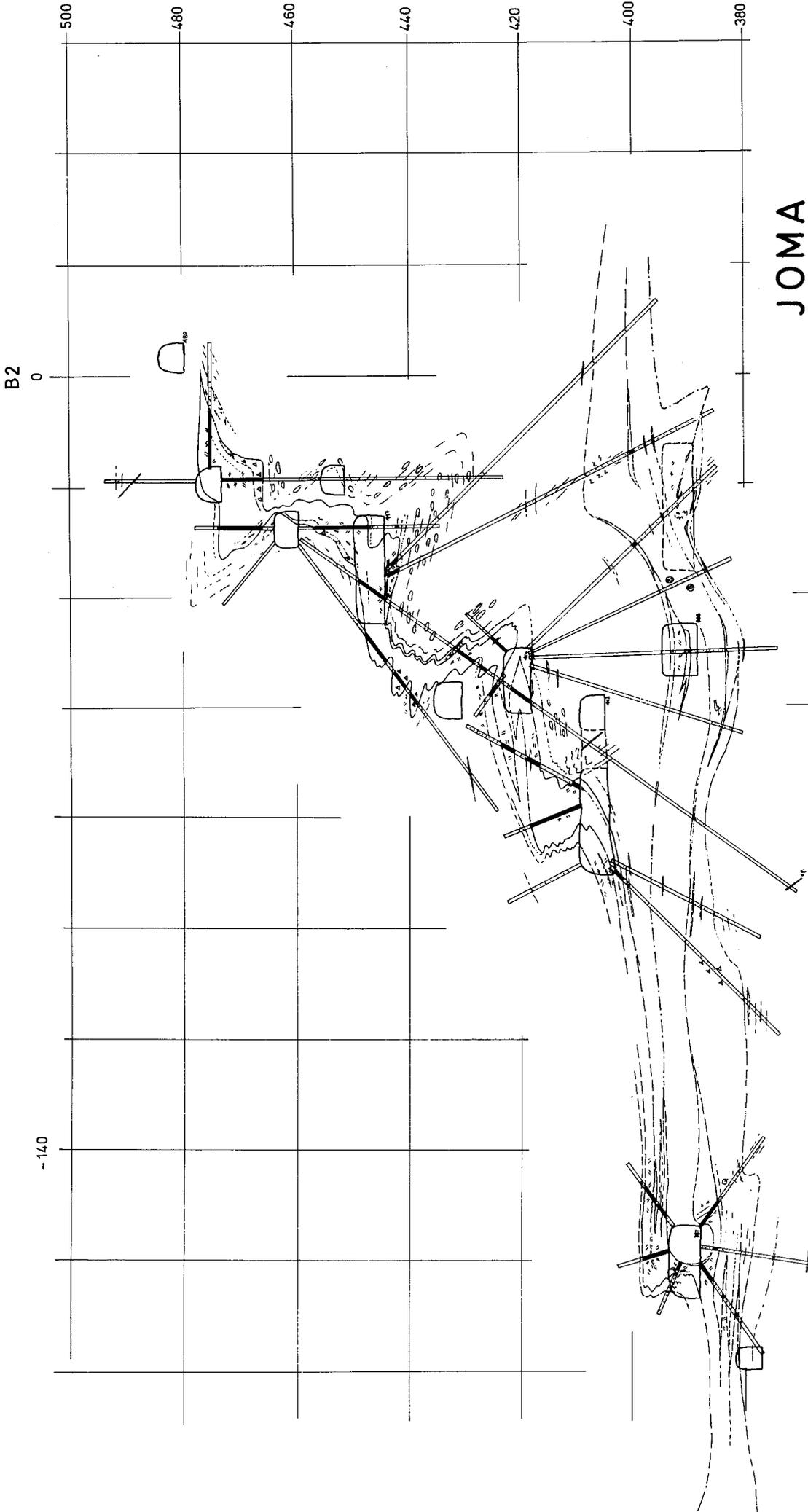


# B2-11

VERTIKAL PROFIL	MALESIT
SERIE B2	1:500
CDONIC CO. INTERAIR	

AR 84

300

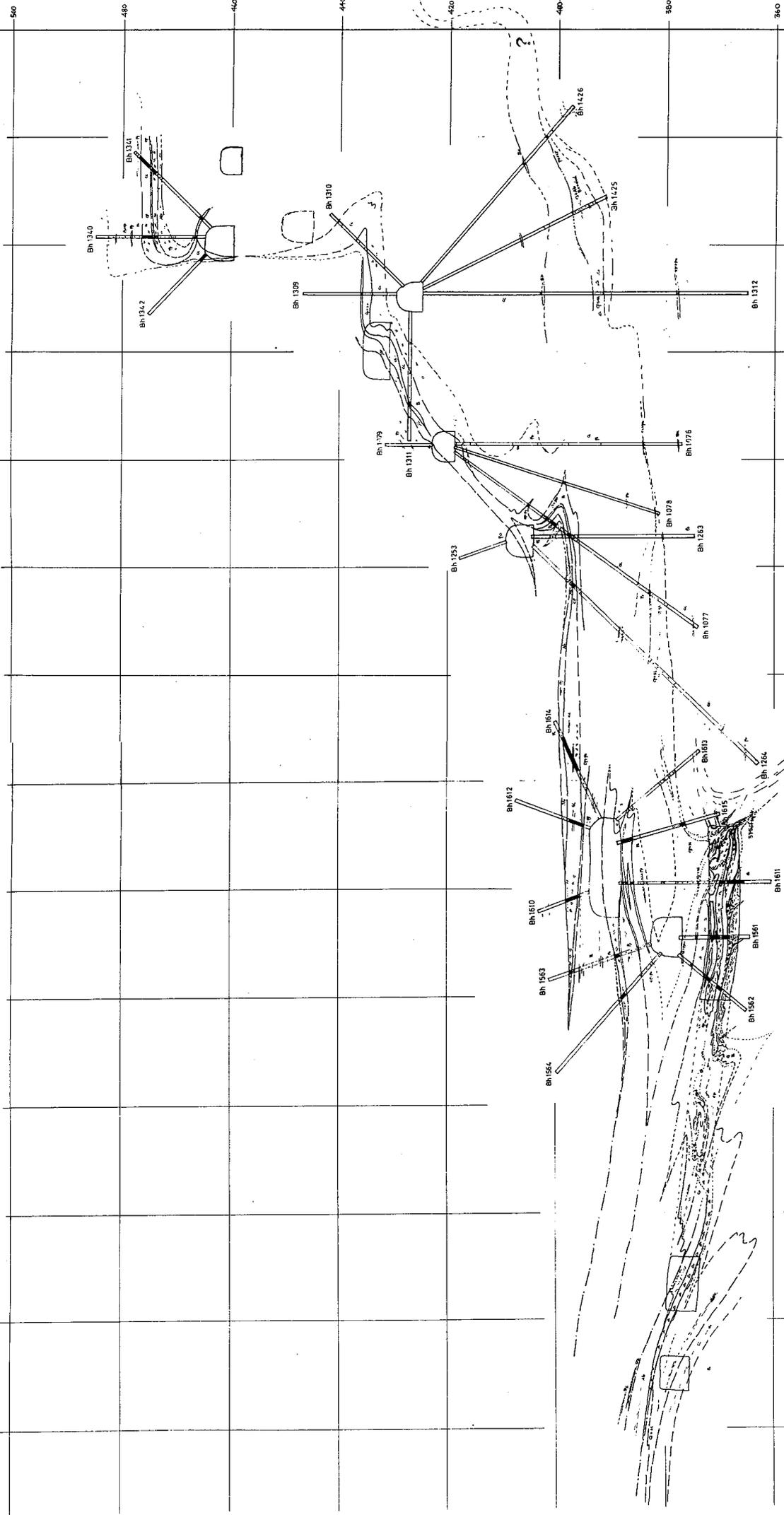


JOMA

B<sub>2</sub> - 13

VERTICAL PROFILE B2 - 13	1:500	GRONG GRUBER A/S
	AR/86	

B2



B2-15

AR 84

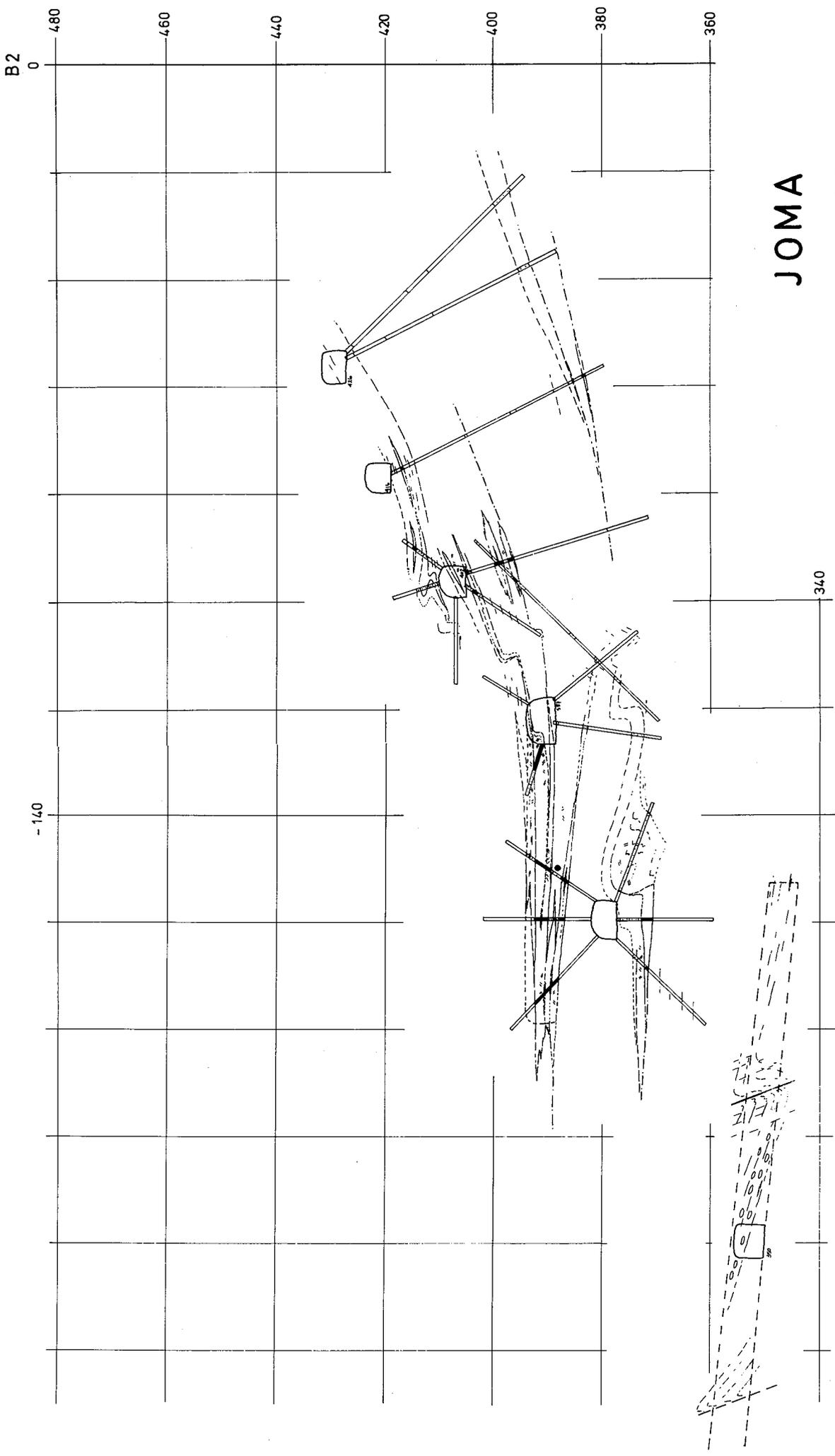
340

360

VERTIKALPROFIL  
SERIE: B2

MÄL  
1:500

GRONG GRUBER  
F. 15



JOMA  
B<sub>2</sub> - 17

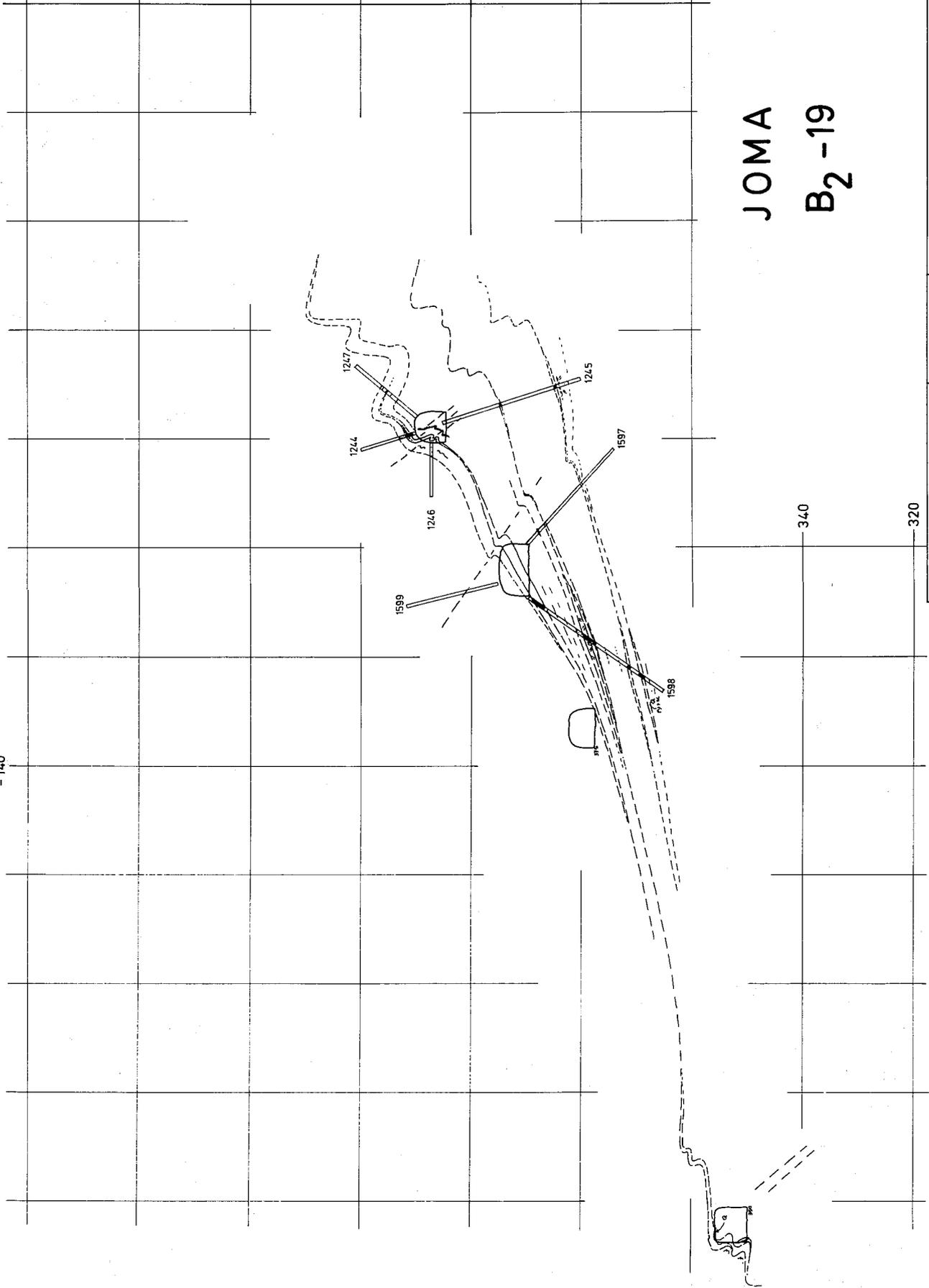
VERTICAL PROFILE B <sub>2</sub> - 17	1 : 500	GRONG GRUBER A/S
	AR/86	

B2  
0

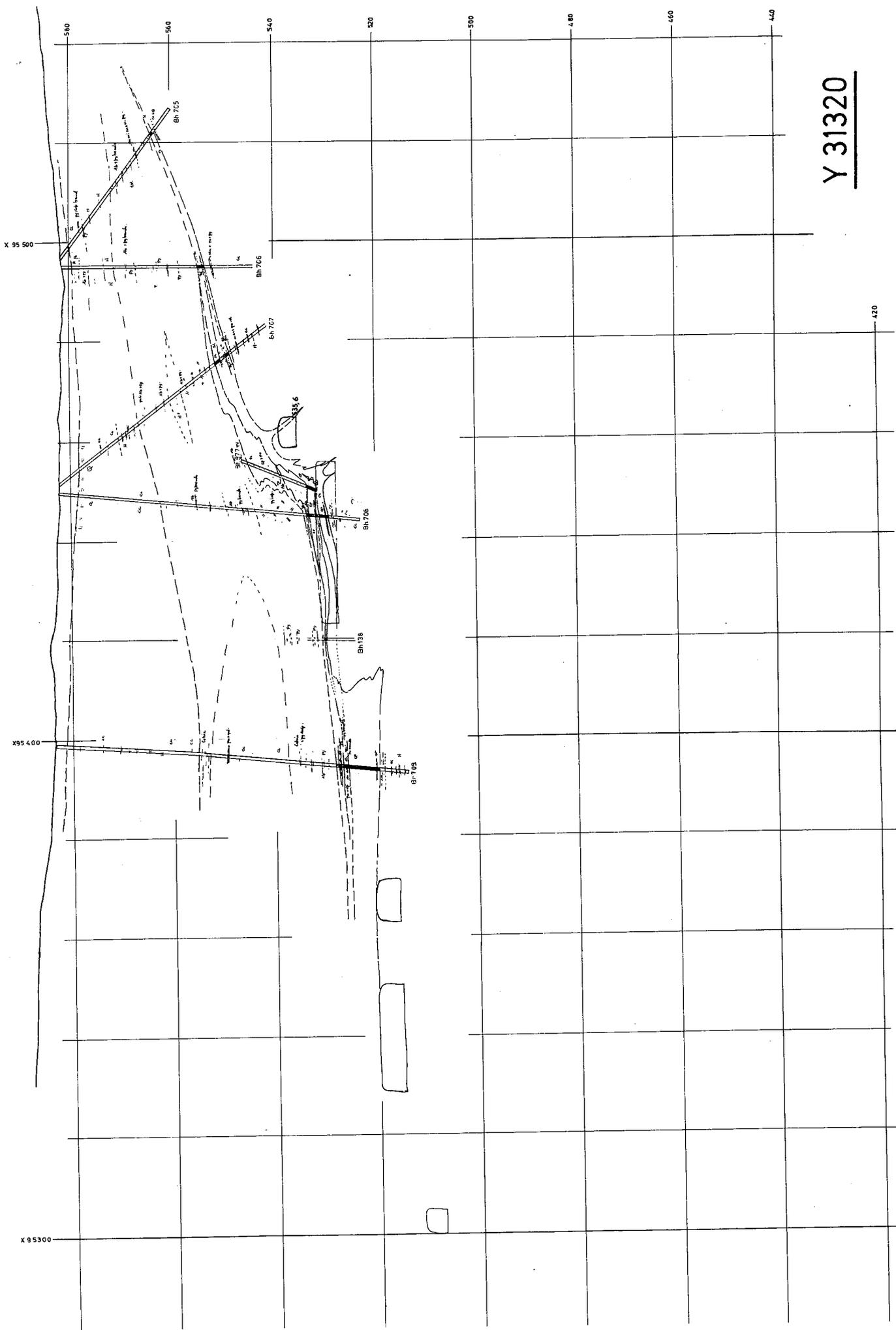
480  
460  
440  
420  
400  
380  
360

-140

# JOMA B<sub>2</sub> - 19



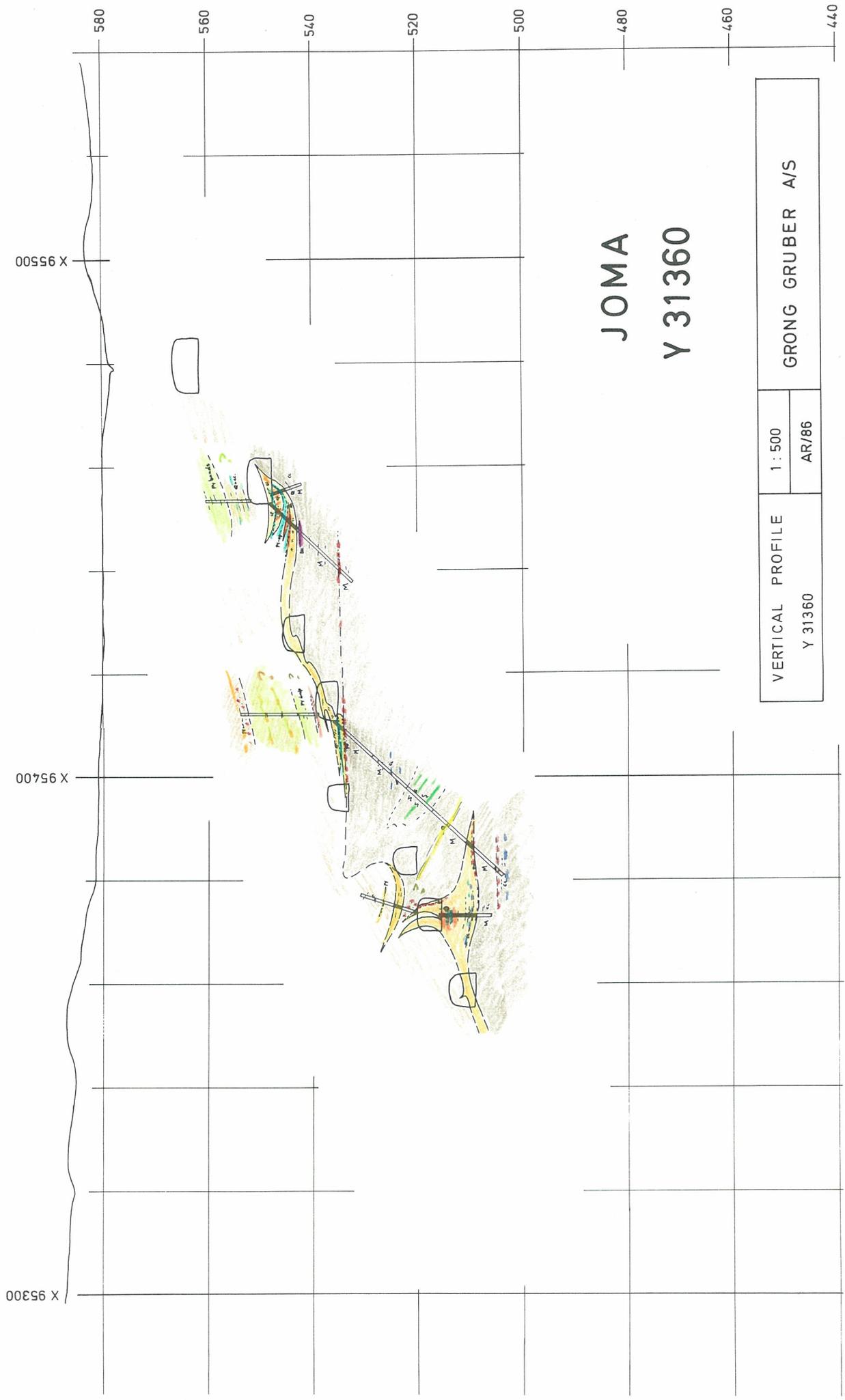
VERTICAL PROFILE B2 - 19	1 : 500	GRONG GRUBER A/S
	AR/86	



Y 31320

VERTIKALPROFIL	MÅL
SERIE: Y	1: 500

AR 94



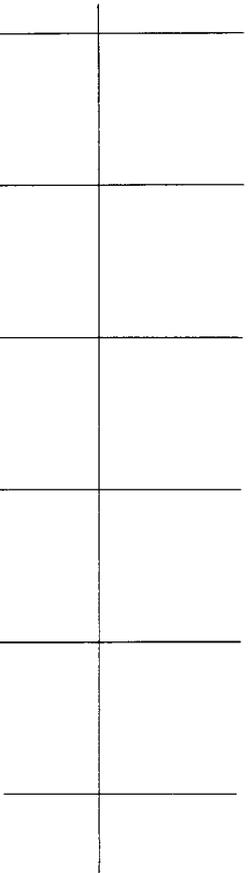
JOMA  
Y 31360

VERTICAL PROFILE Y 31360	1 : 500	GRONG GRUBER A/S
	AR/86	

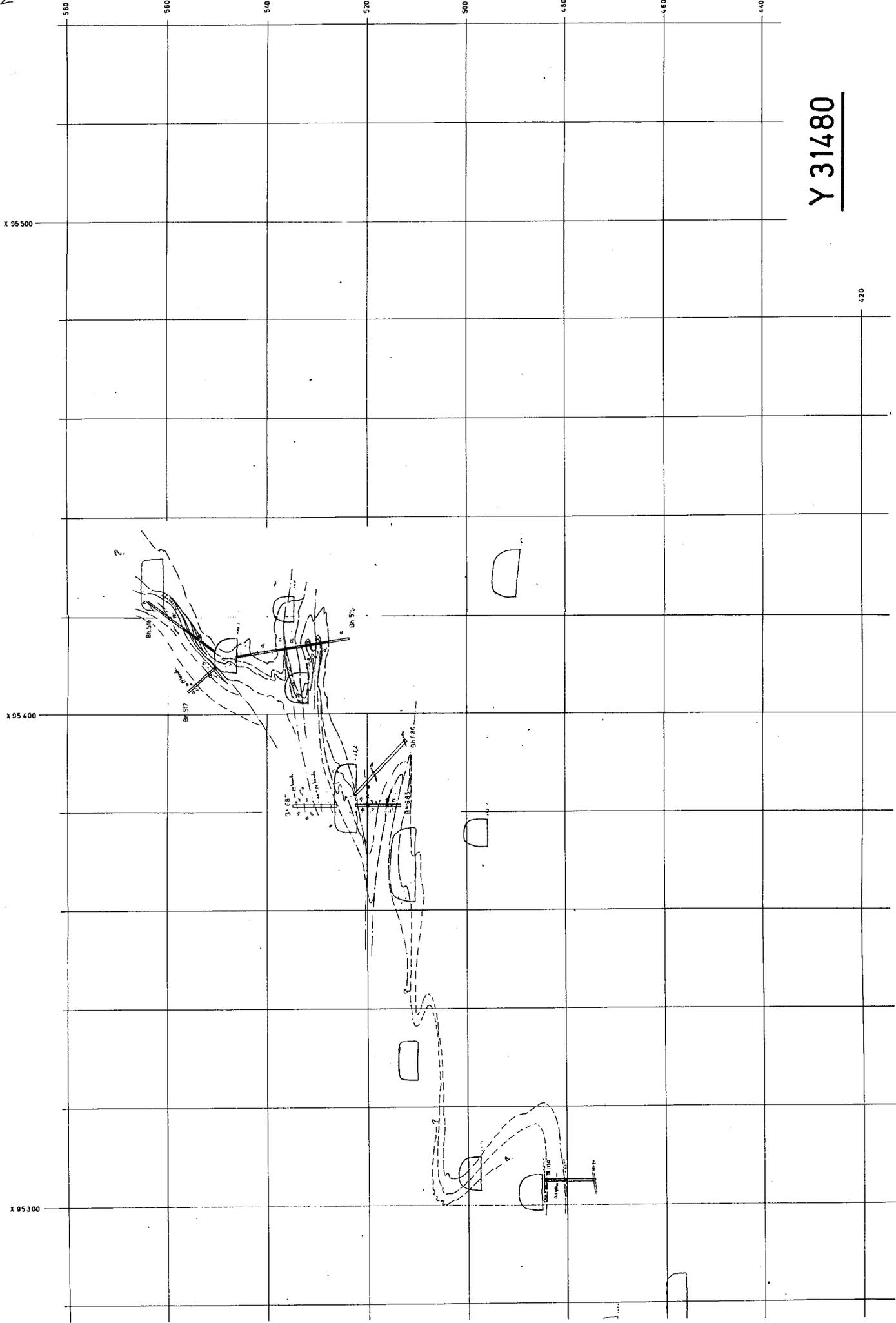


JOMA  
Y 31400

VERTICAL PROFILE Y 31400	1:500	GRONG GRUBER A/S
	AR/86	



N

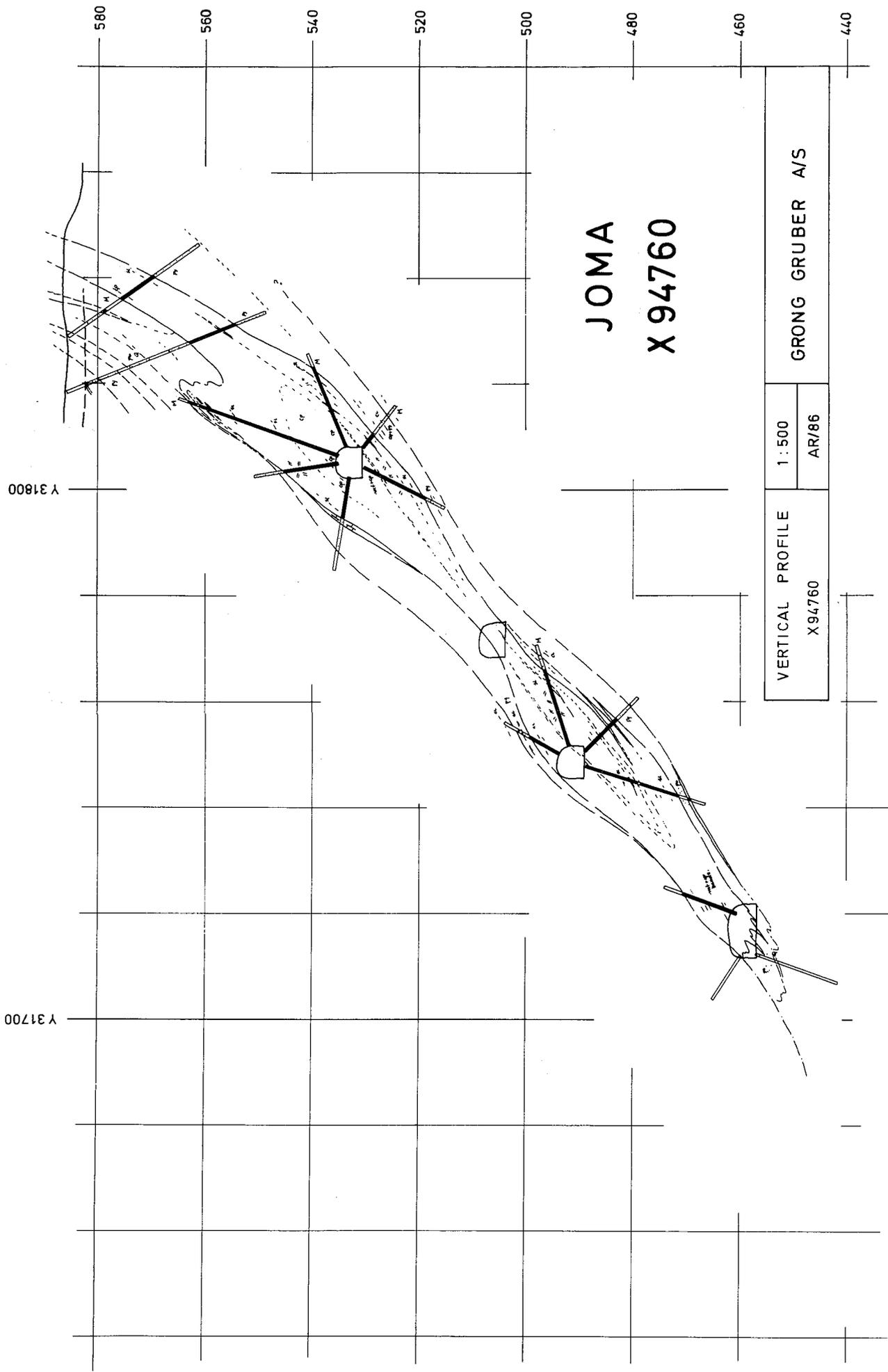


081480

VERTIKAL PROFIL	MAL.
SERIE : Y	1:500

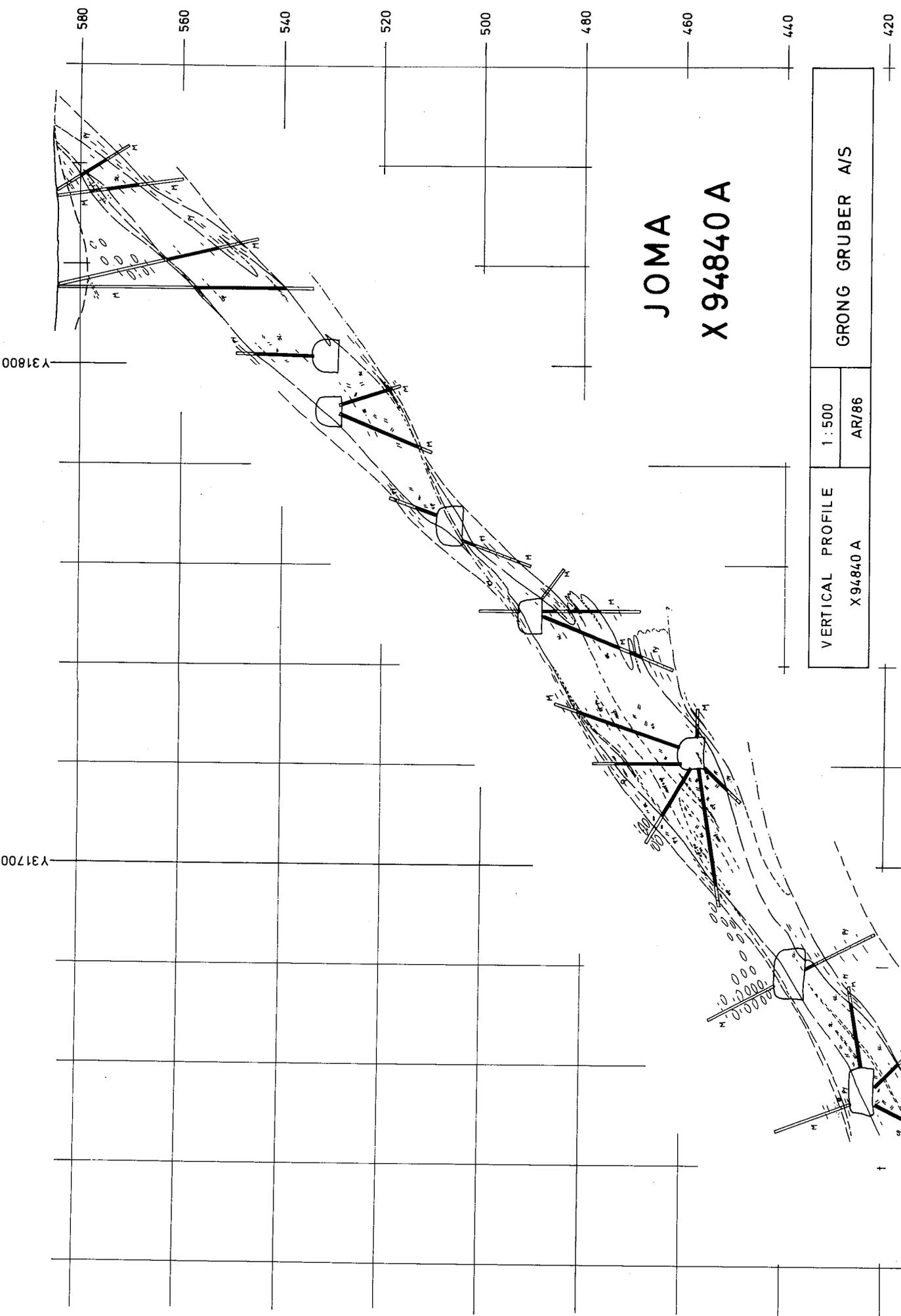
AR'84

420



JOMA  
X 94760

VERTICAL PROFILE X 94760	1:500	GRONG GRUBER A/S
	AR/86	



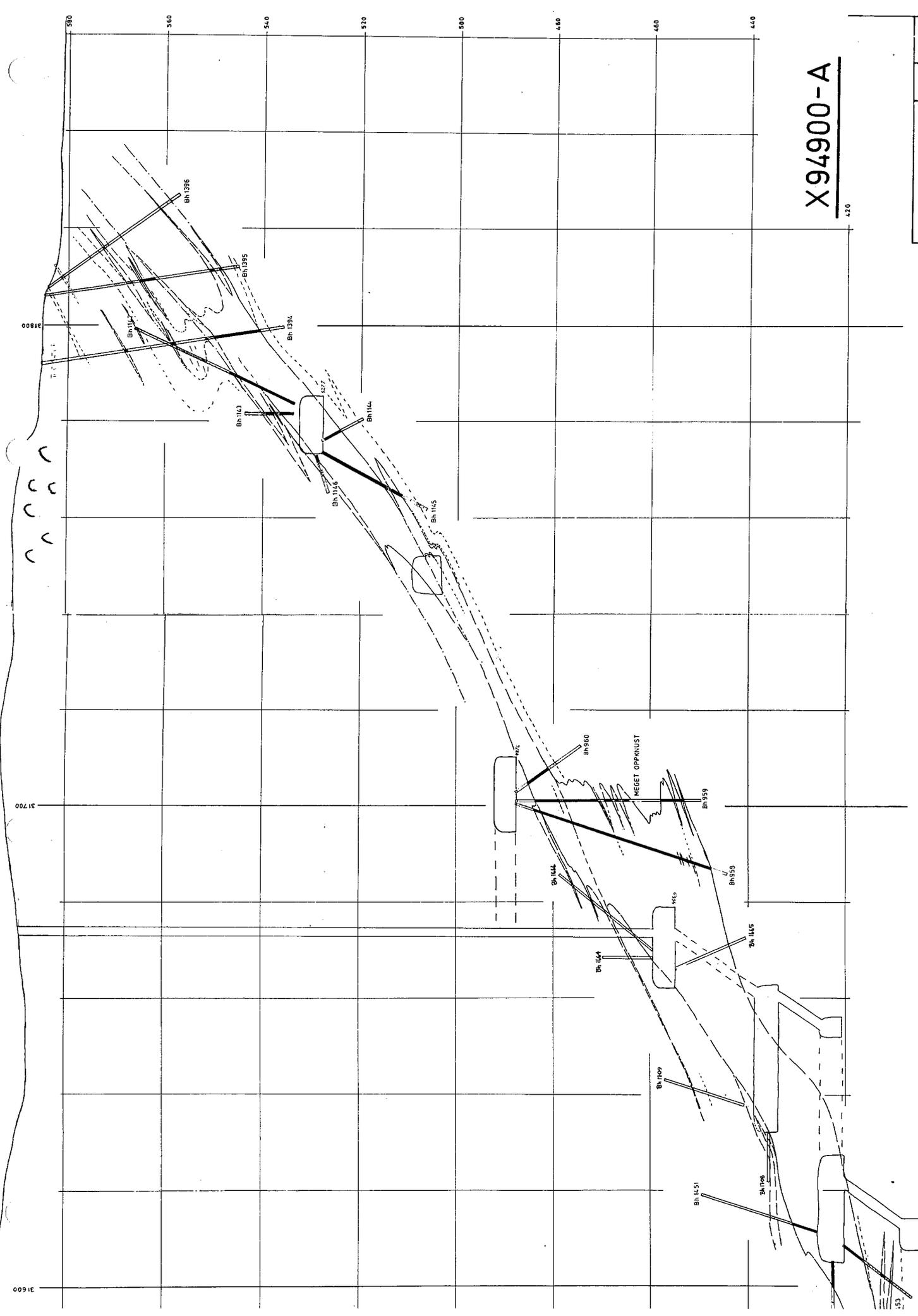
**JOMA**  
**X 94840 A**

VERTICAL PROFILE X 94840 A	1 : 500	GRONG GRUBER A/S
	AR/86	

Y31800

Y31700

580 560 540 520 500 480 460 440 420

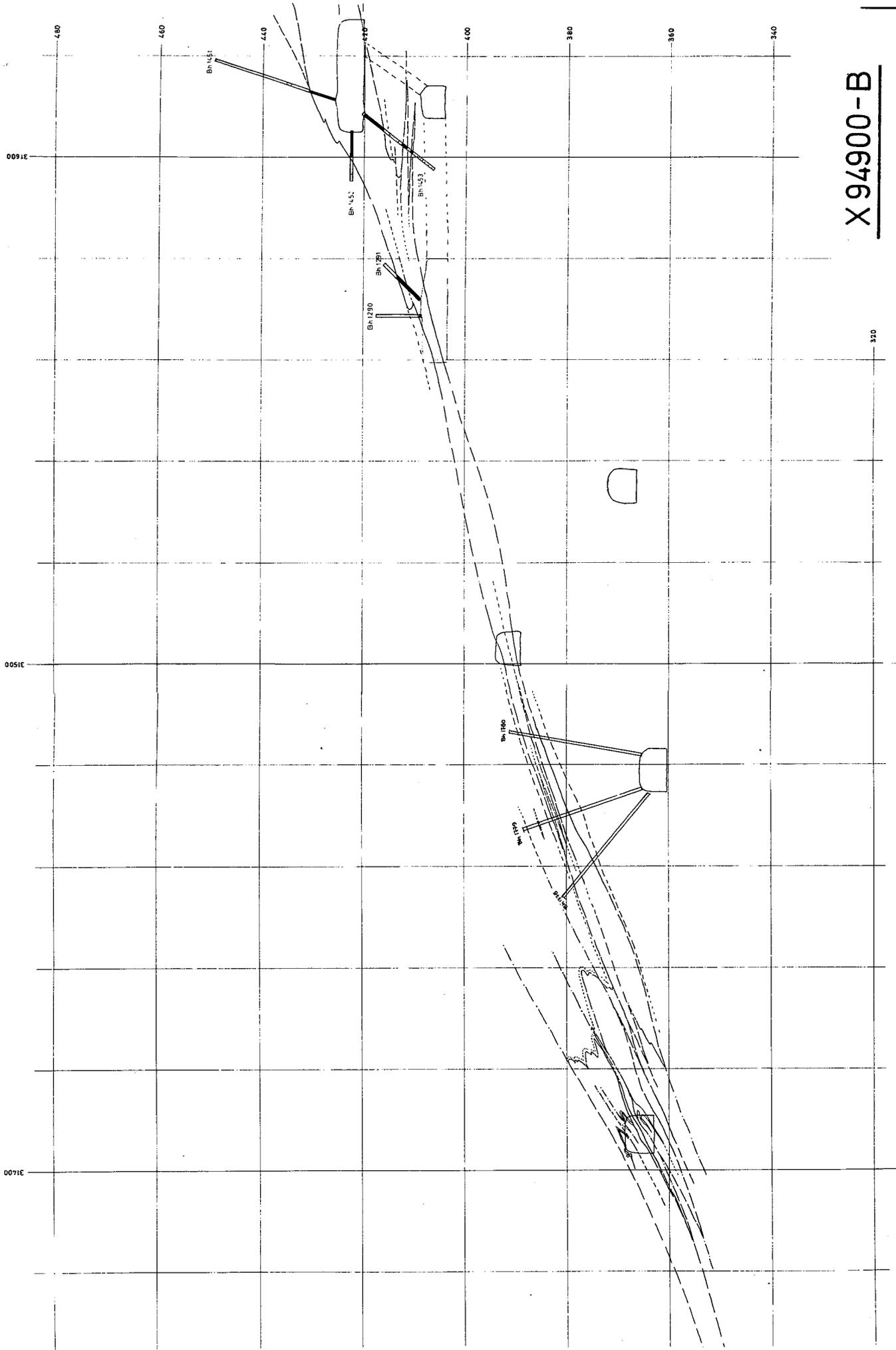


X94900-A

420

VERTIKALPROFIL	MÅL	1:500
SERIE: X		
SDONG CDI 1802A7		

AR'84



X 94900-B

VERTIKALPROFIL	MÅL
SERIE: X	1:500
GÖMME GÖLIDEDAVIC	

AP 84

320

3100

3150

3160

480

460

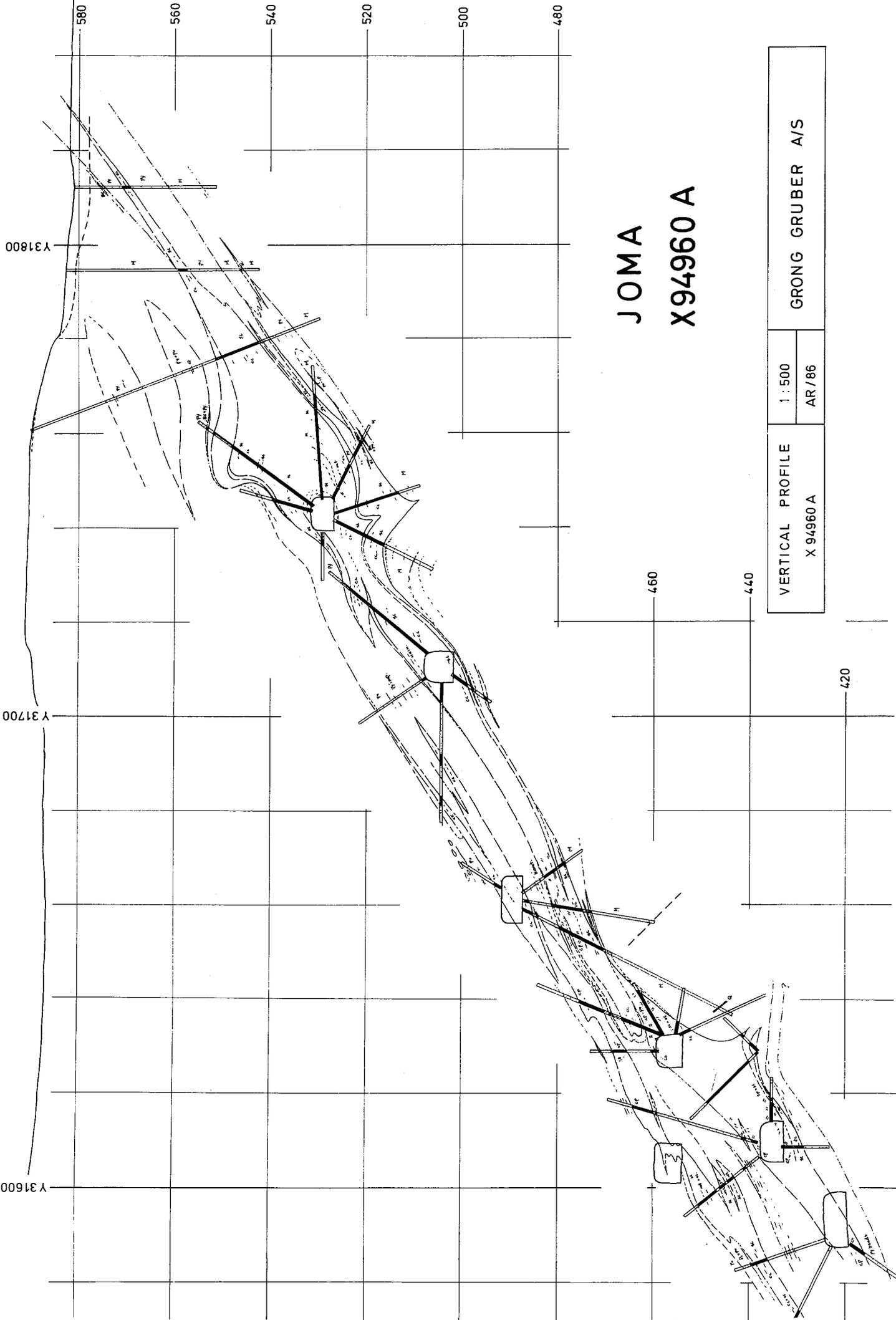
440

400

380

360

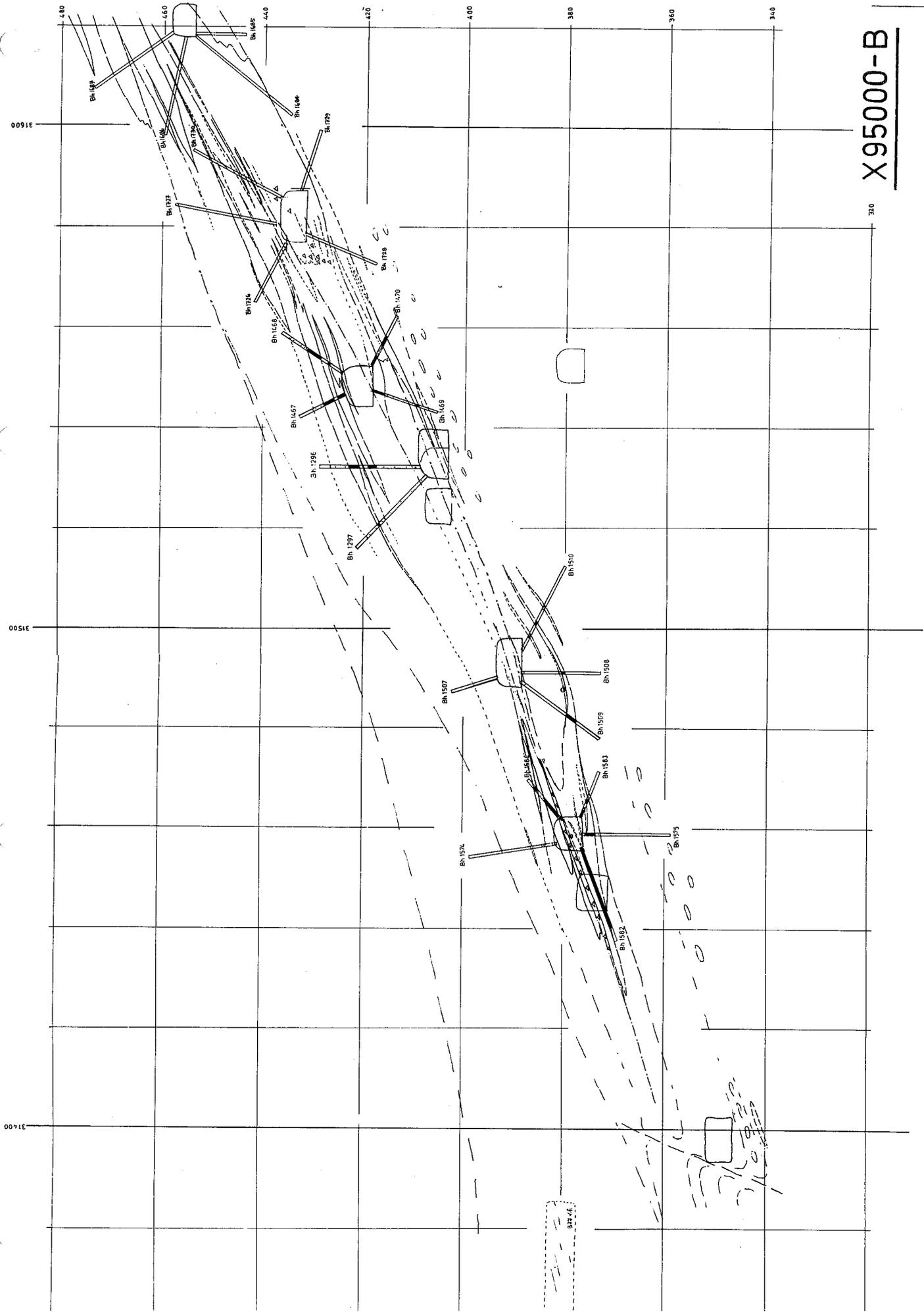
340



# JOMA X94960 A

VERTICAL PROFILE X 94960 A	1 : 500	GRONG GRUBER A/S
	AR/86	





# X95000-B

VERTIKALPROFIL	MÅL
SERIE: X	1 500
GRONIG: CDUBEDAZ	

AK 124

Y31600

Y31700

Y31800

580

560

540

520

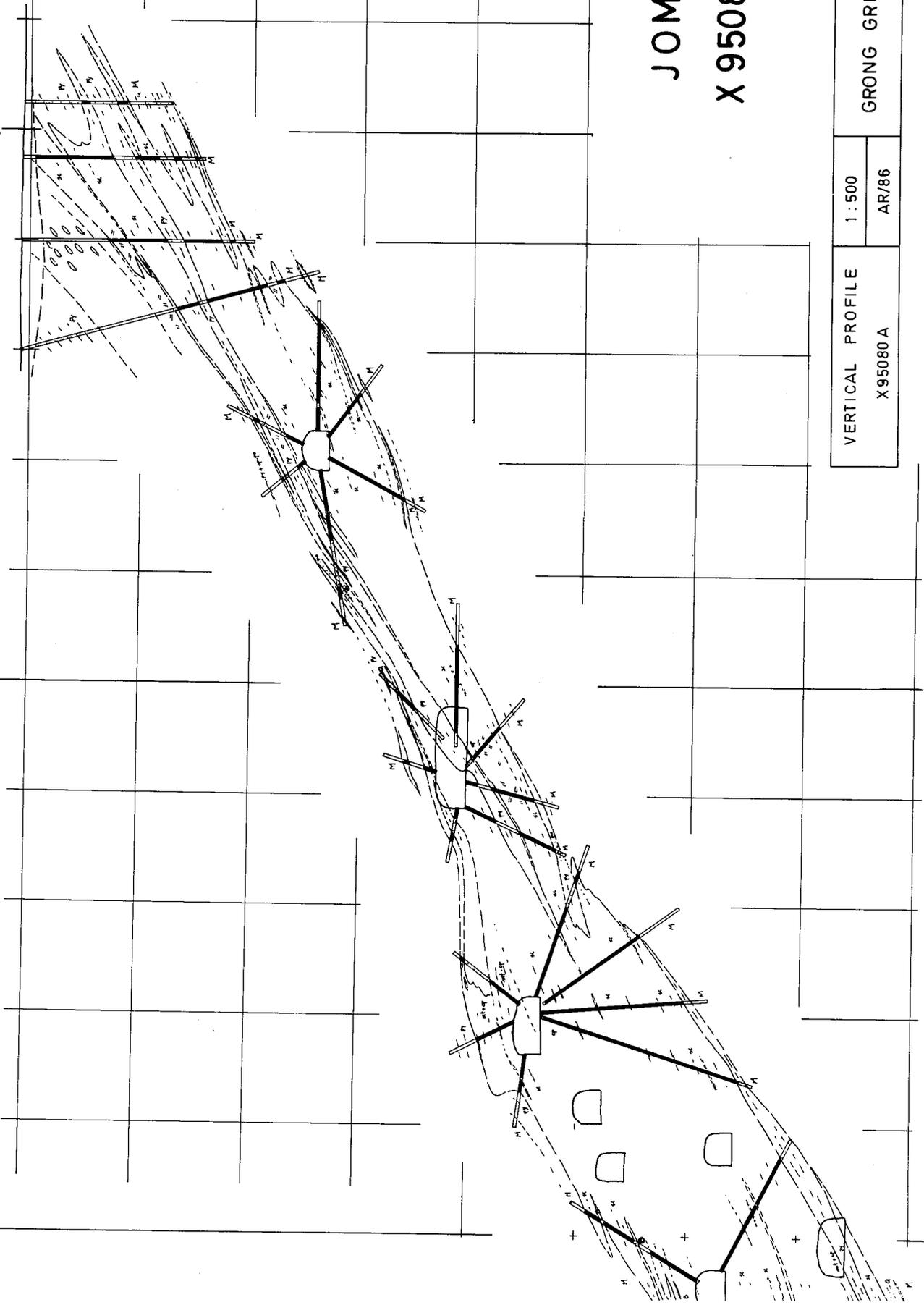
500

480

460

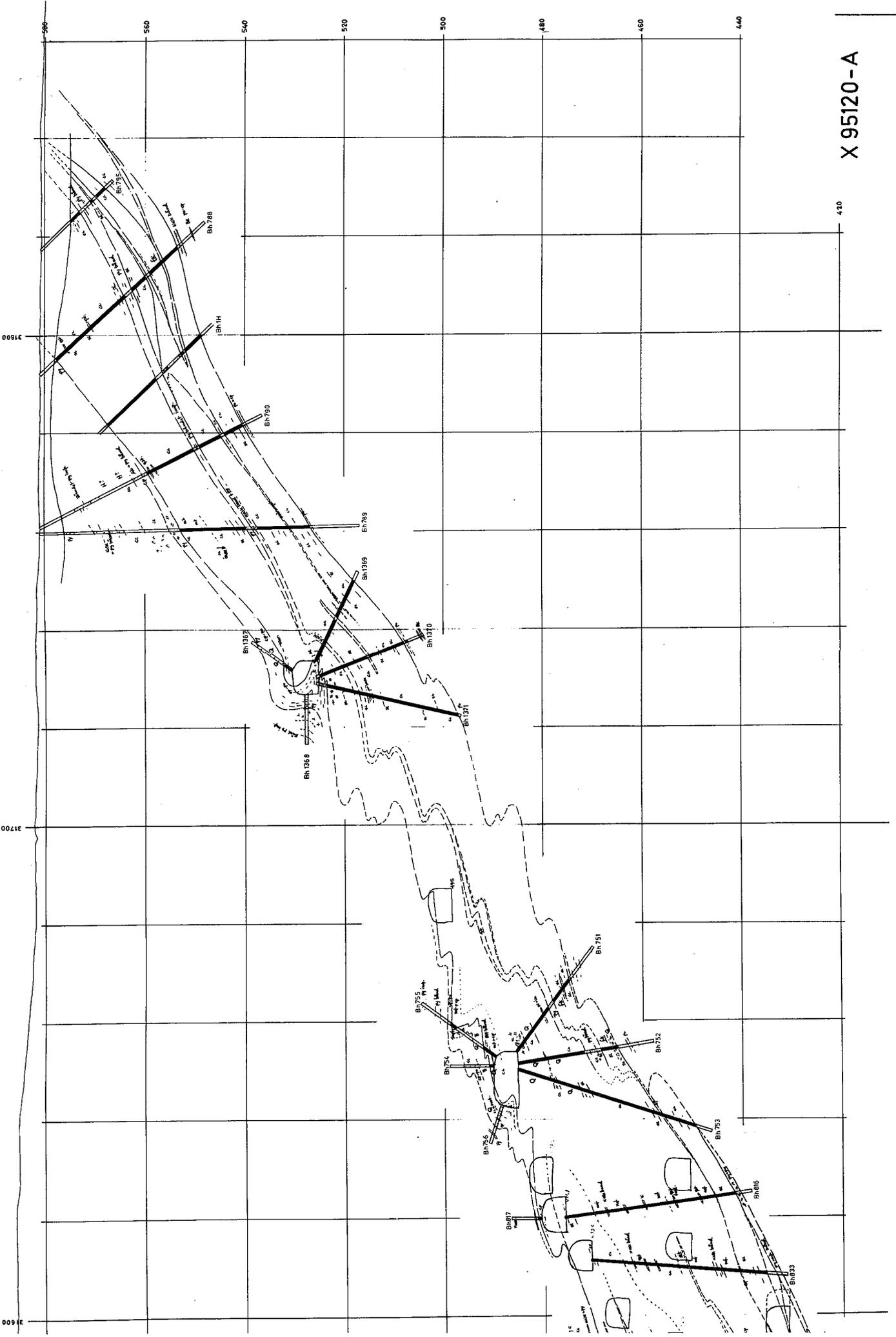
440

420



# JOMA X 95080 A

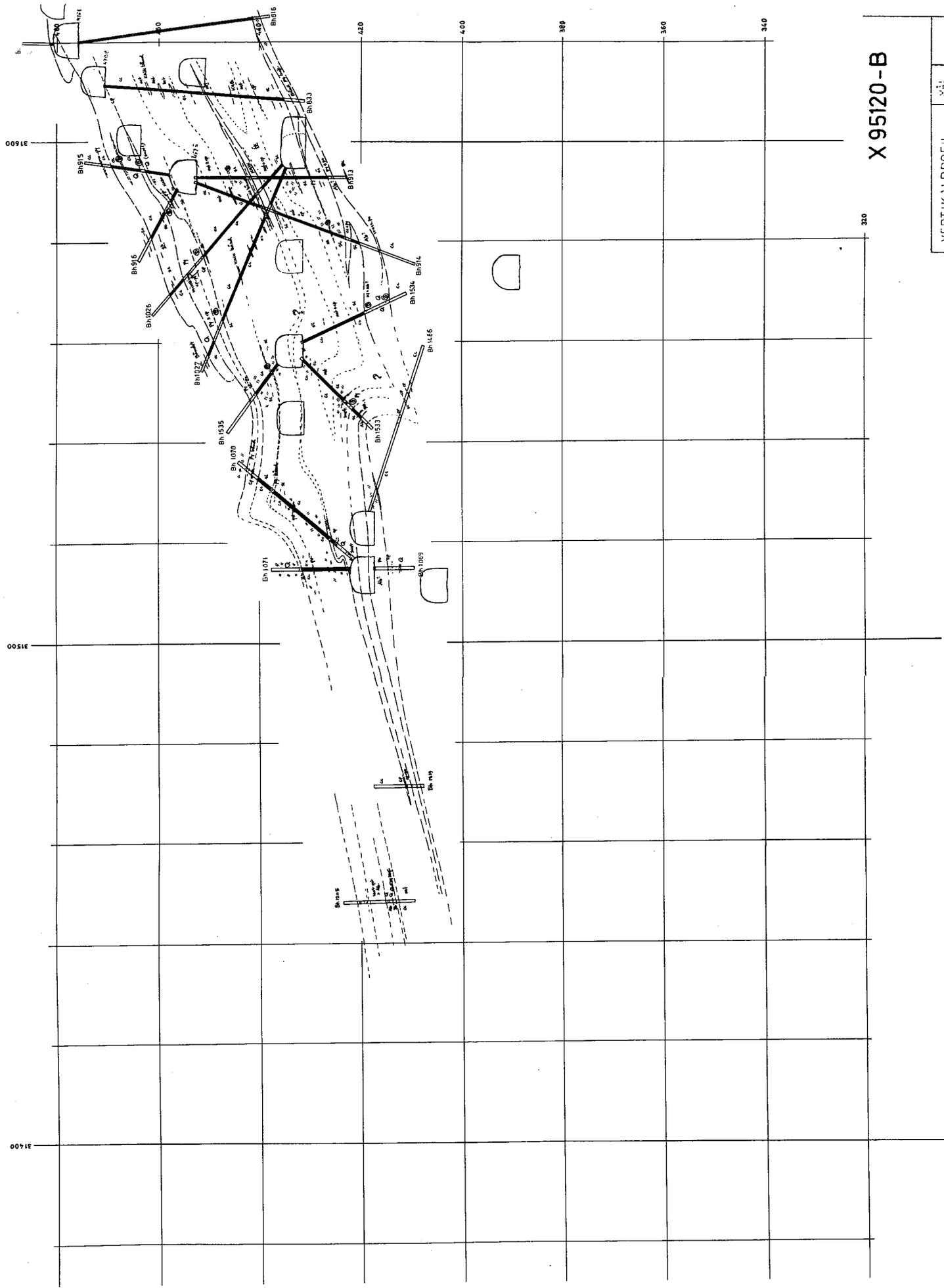
VERTICAL PROFILE X 95080 A	1 : 500	GRONG GRUBER A/S
	AR/86	



420

X 95120-A

VERT. KALPROFIL	MAL	
SERIE: X	1500	
GRONG GRUIFRAXE		Dr. v. 05.120 A



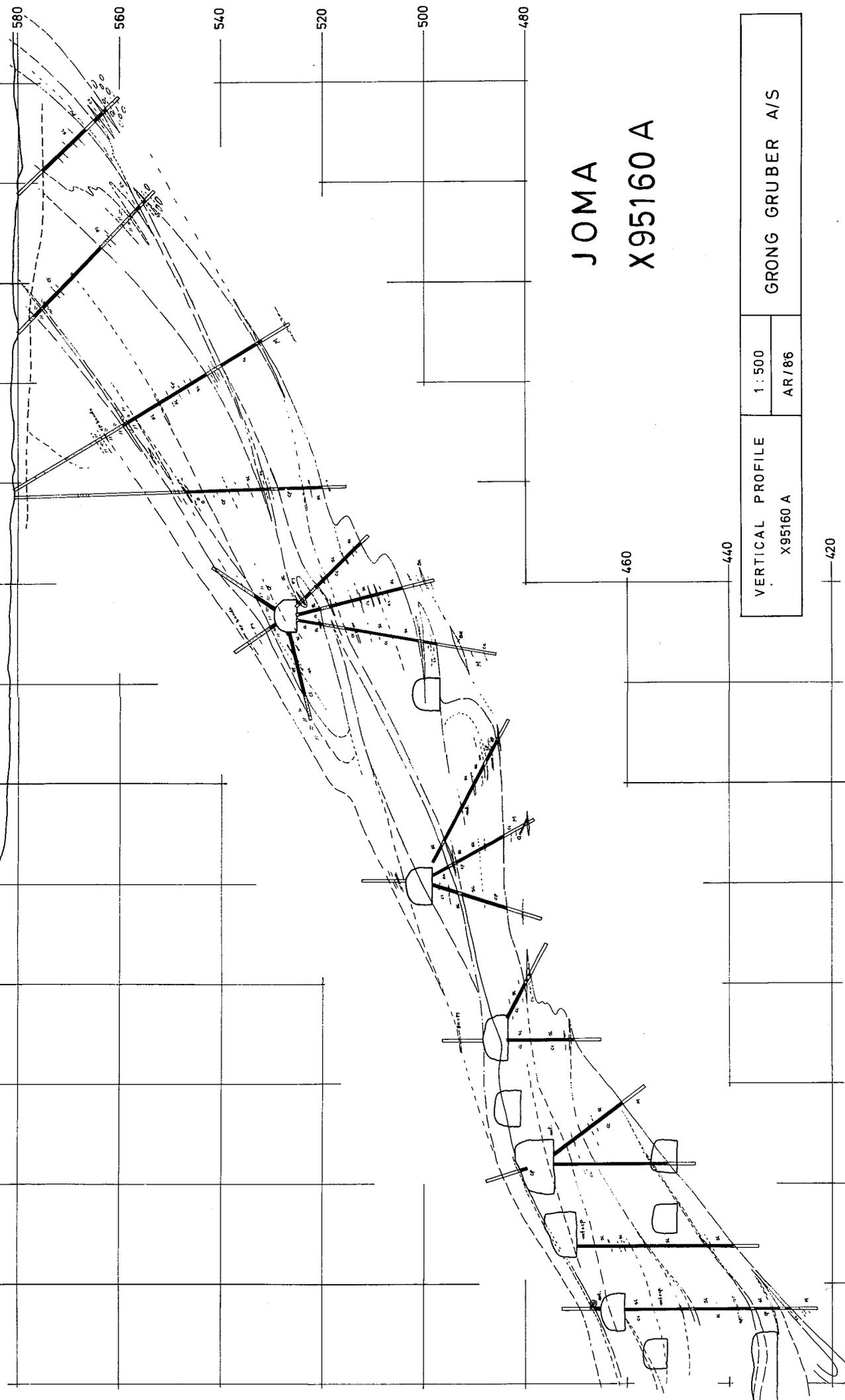
X 95120 - B

VERTIKALPROFIL	MÄTT	1:500
SERIE: X		
GRÖNIG GRIFFER AB IN. V. 061703		

Y31800

Y31700

Y31600



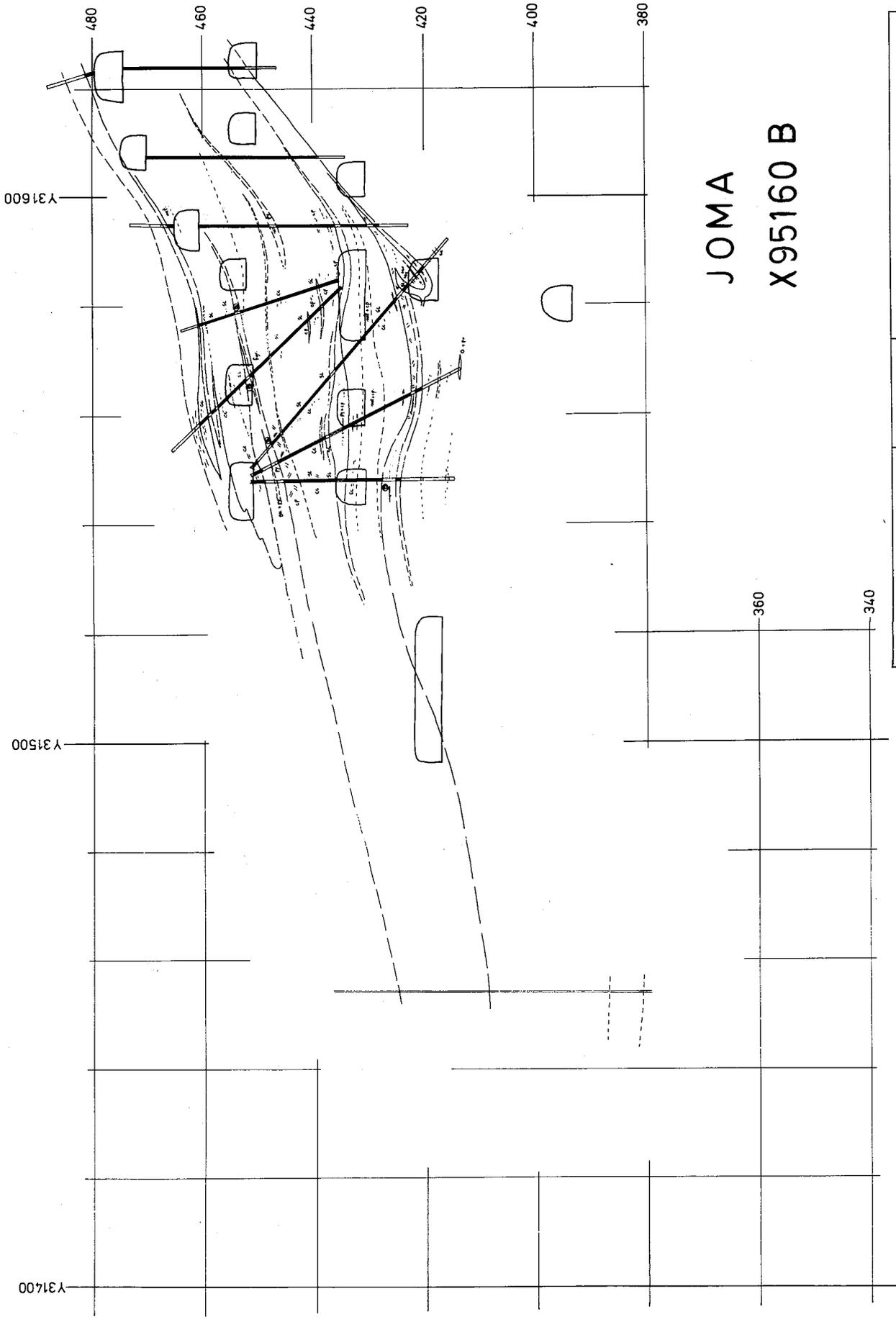
JOMA

X95160 A

VERTICAL PROFILE  
X95160 A

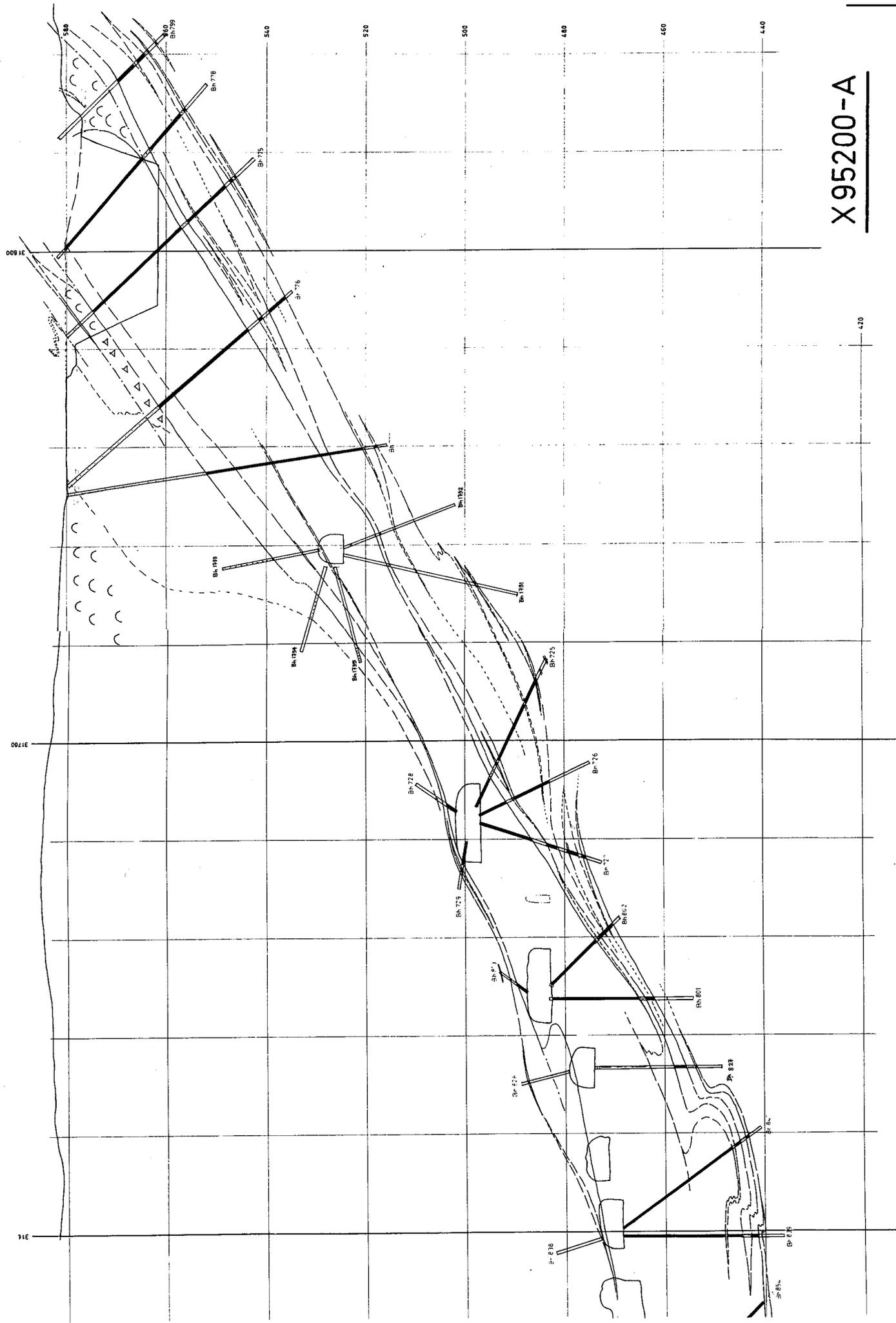
1 : 500  
AR / 86

GRONG GRUBER A/S



JOMA  
X95160 B

VERTICAL PROFILE X95160 B	1:500	GRONG GRUBER A/S
	AR/86	

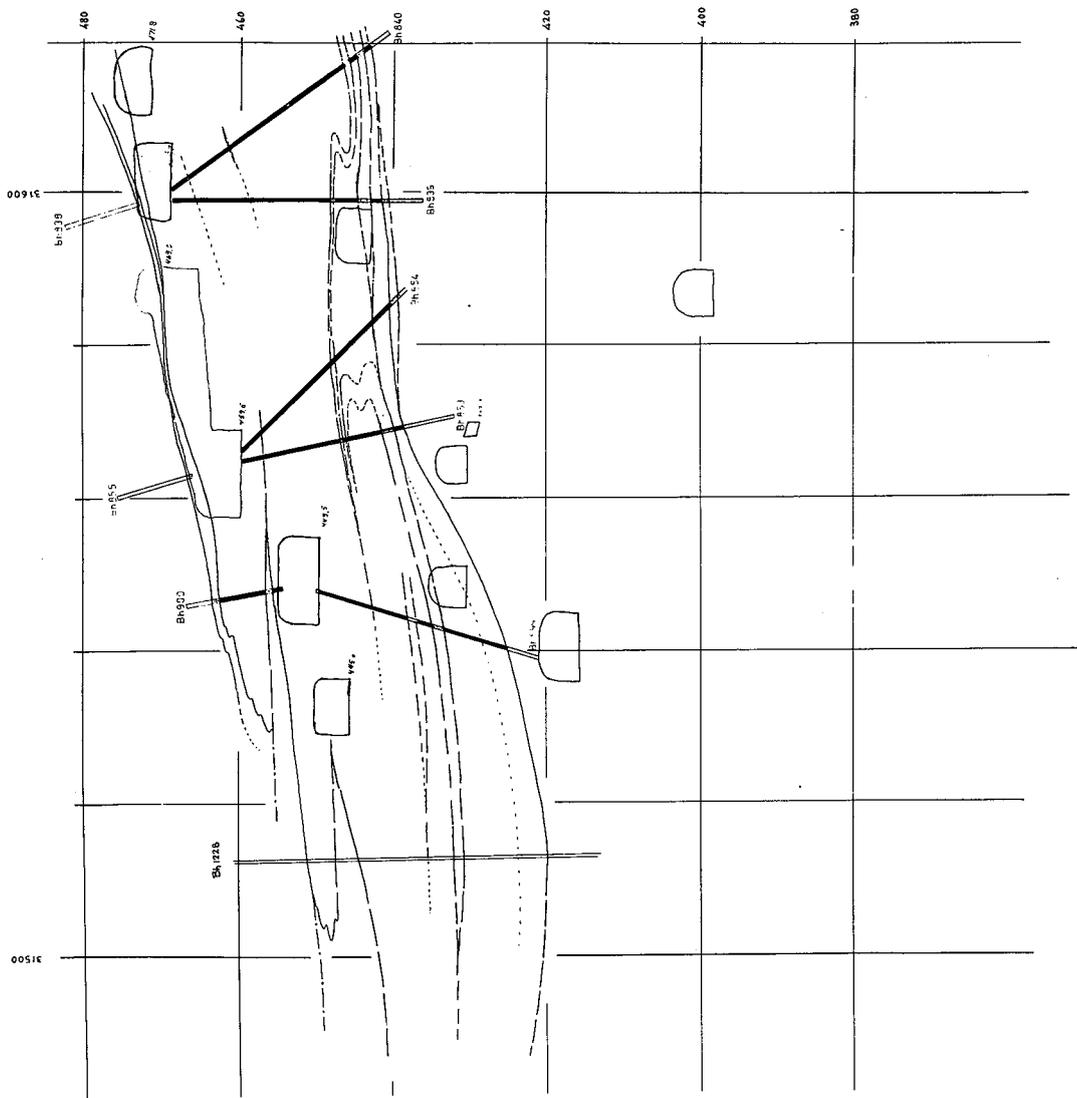


# X95200-A

VERTIKALPROFIL	MAß	LR
SERIE: X	1:500	1/2-84
GRONG GRUBERAI/PI: X95200 A		

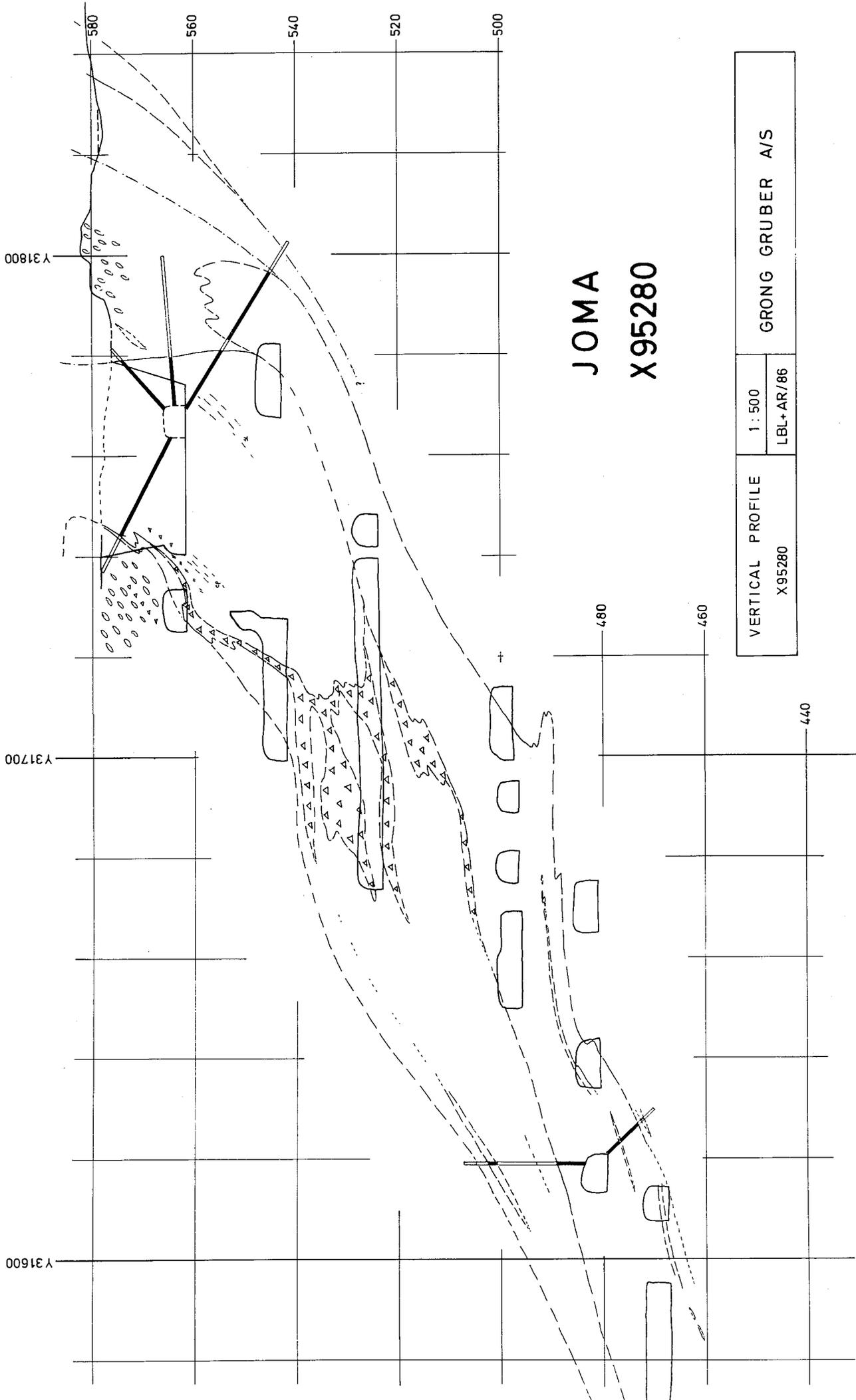
AR'84

420



X95200-B

AR84



JOMA  
X95280

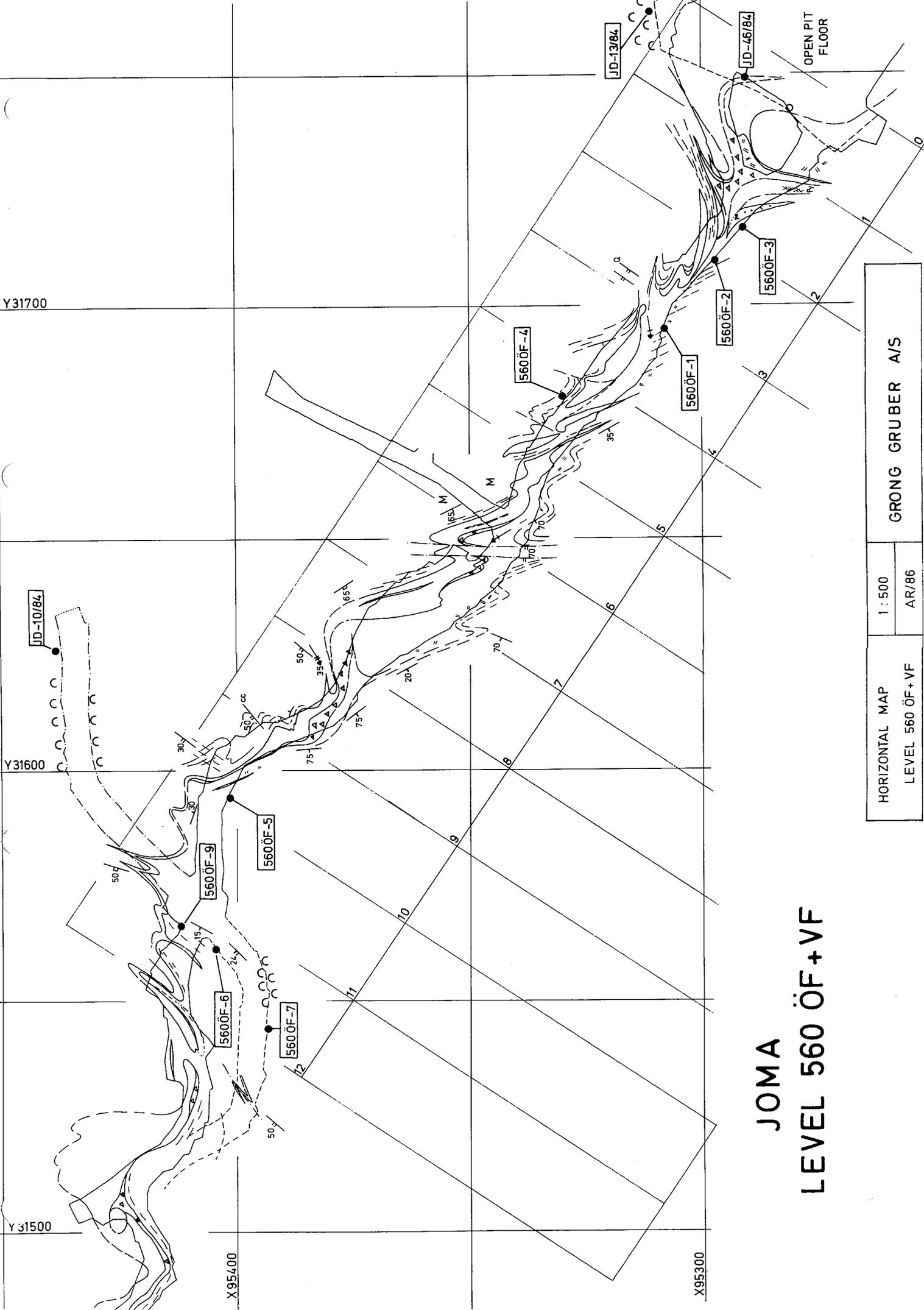
VERTICAL PROFILE X95280	1:500	GRONG GRUBER A/S
	LBL+AR/86	

440

APPENDIX G.

G.1      FOUR HORIZONTAL GEOLOGICAL MAPS OF JOMA ORE BODY (SCALE 1:500).  
(Also shows whole rock sample localities sites.)

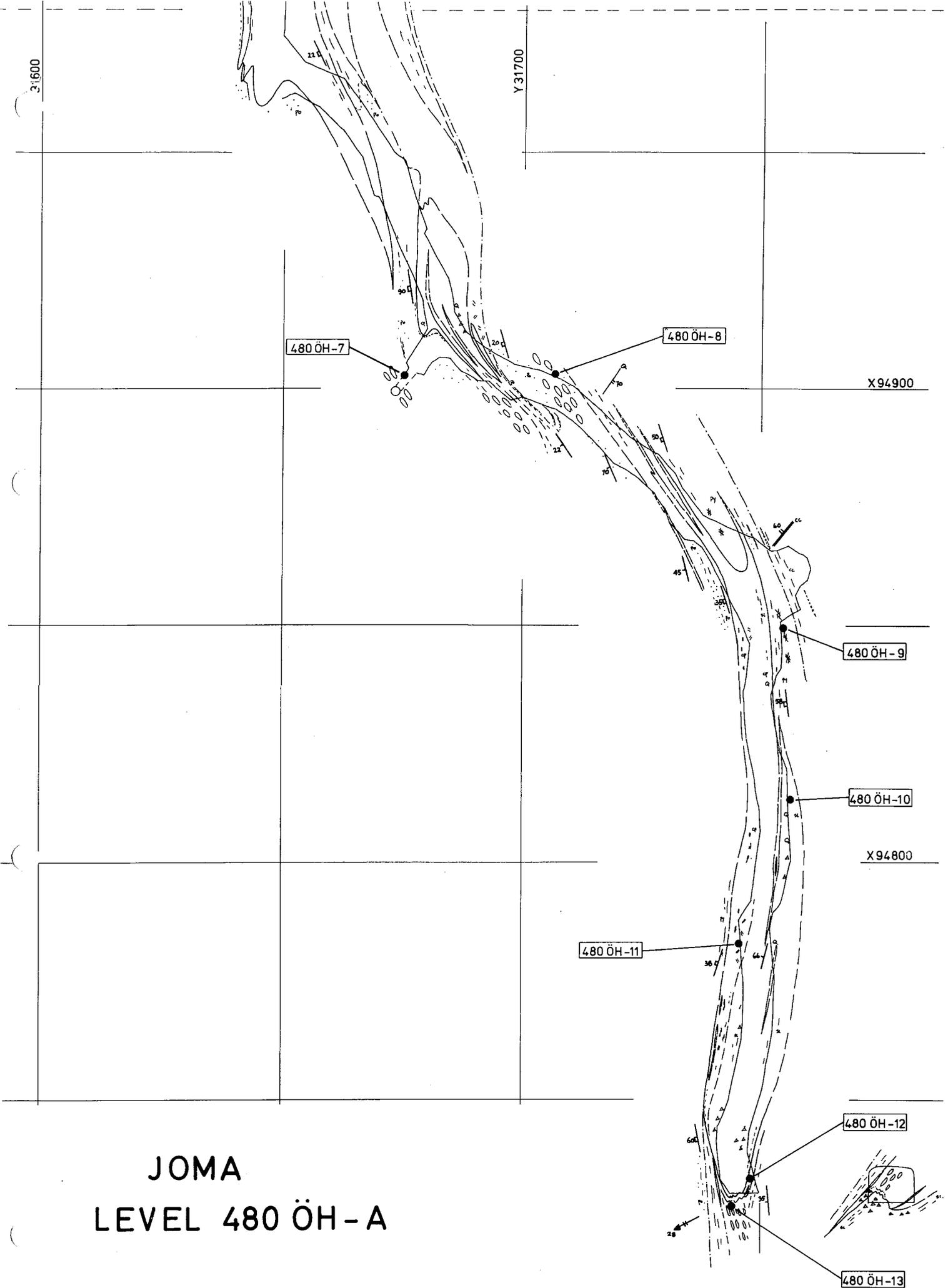
LEVEL:      560  
                 480  
                 402  
                 375



**JOMA**  
**LEVEL 560 ÖF + VF**

HORIZONTAL MAP LEVEL 560 ÖF + VF	1 : 500	GRONG GRUBER A/S
	AR/86	

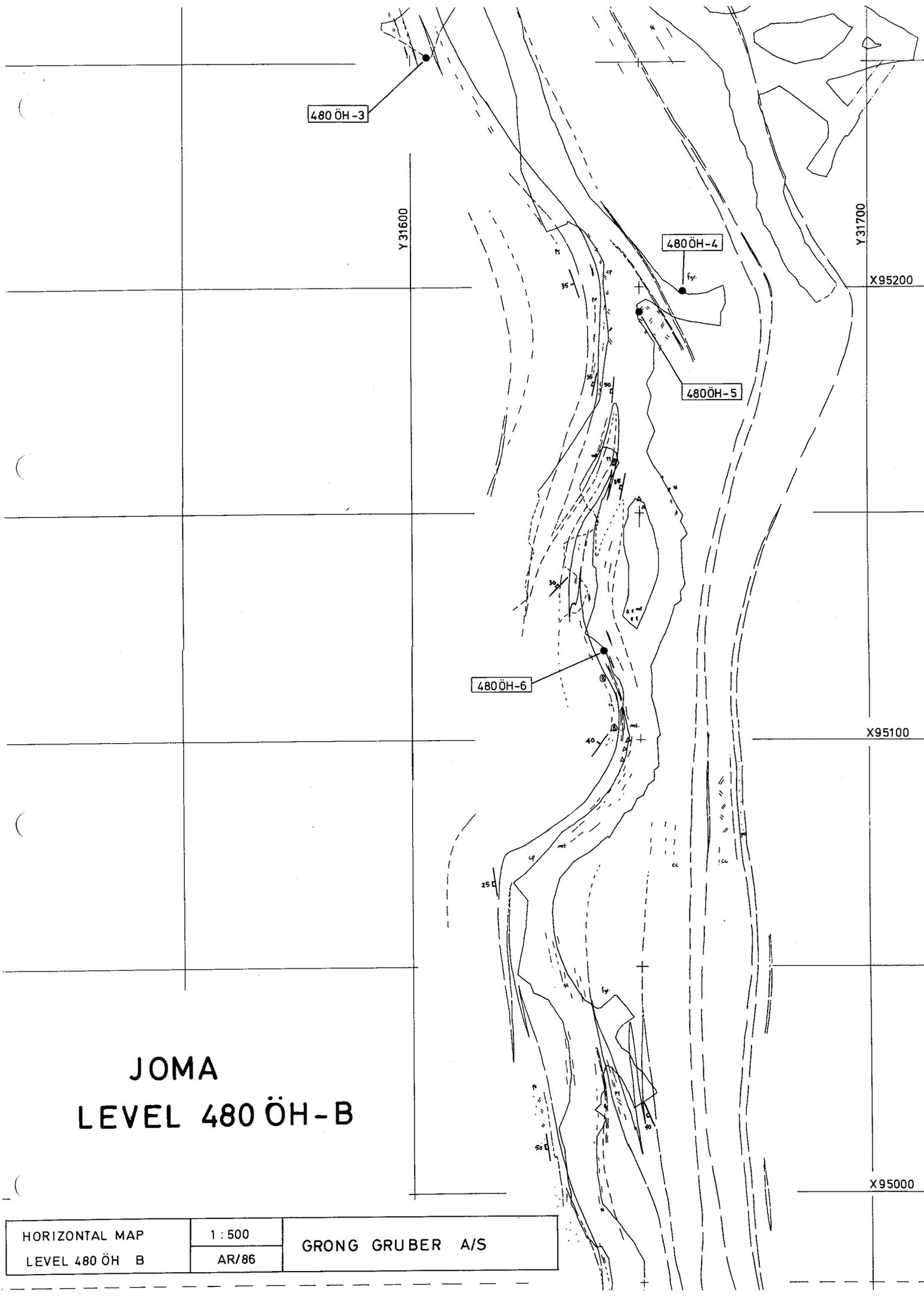




**JOMA  
LEVEL 480 ÖH - A**

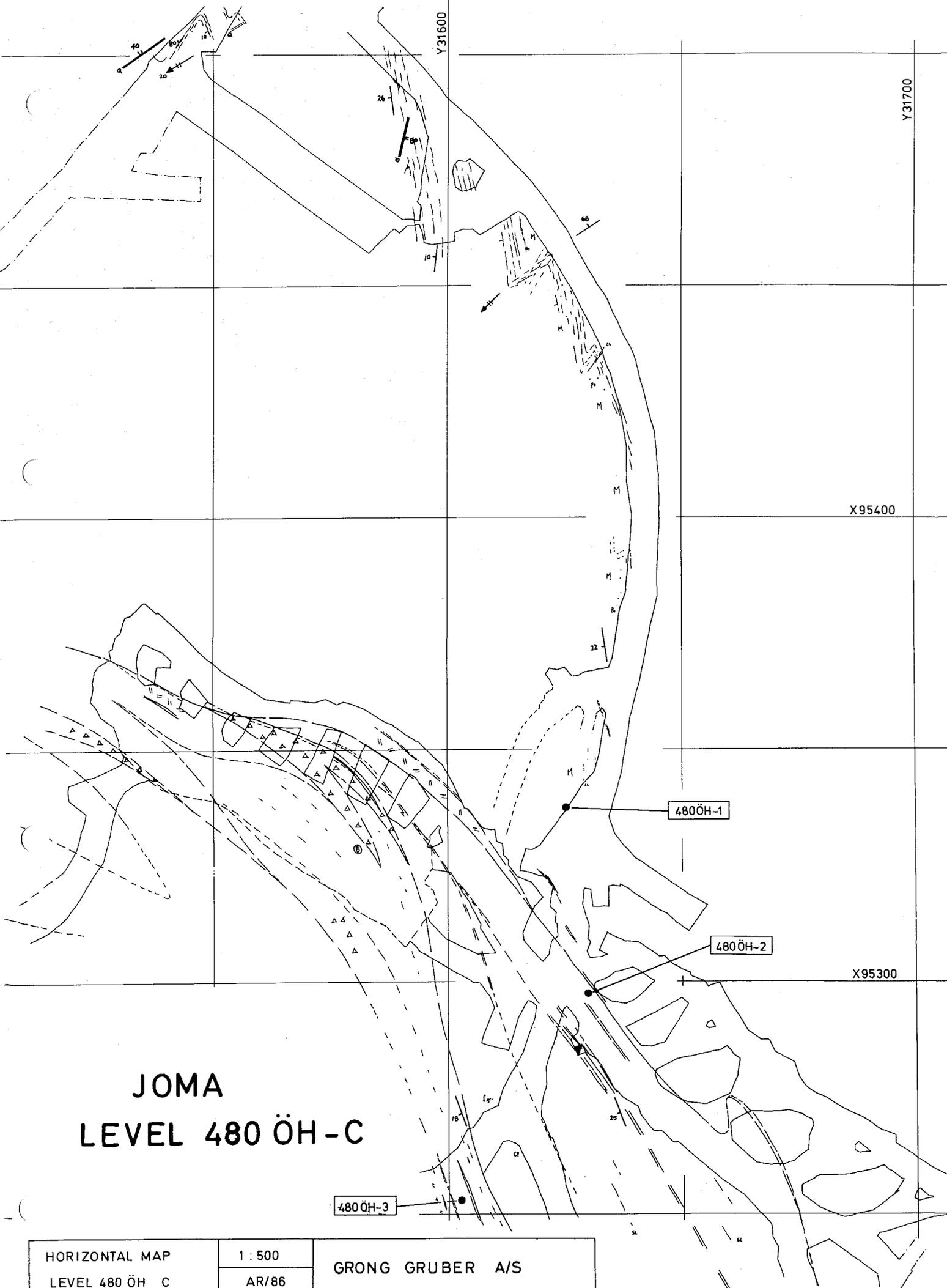
HORIZONTAL MAP LEVEL 480 ÖH A	1 : 500	GRONG GRUBER A/S
	AR/86	

X 94700



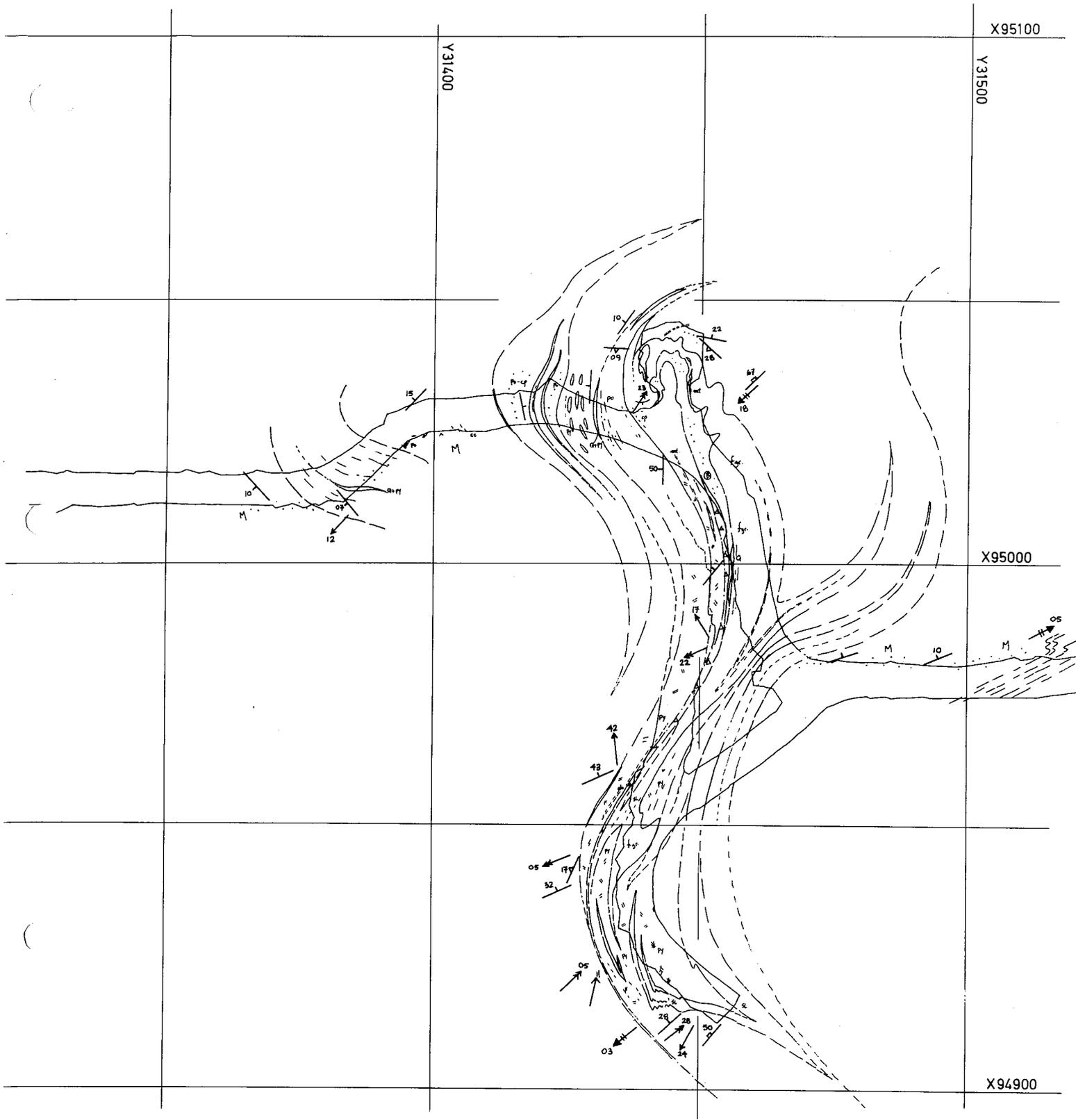
JOMA  
LEVEL 480 ÖH-B

HORIZONTAL MAP LEVEL 480 ÖH B	1 : 500	GRONG GRUBER A/S
	AR/86	



**JOMA  
LEVEL 480 ÖH - C**

HORIZONTAL MAP LEVEL 480 ÖH C	1 : 500	GRONG GRUBER A/S
	AR/86	



JOMA  
LEVEL 375 ÖF+VF

HORIZONTAL MAP LEVEL 375 ÖF+VF	1 : 500	GRONG GRUBER A/S
	AR/86	

APPENDIX H

H.1 FORTY-THREE PHOTOGRAPHS OF HOST SILICATE ROCKS, ORE  
TYPES AND THEIR STRUCTURAL RELATIONS TO EACH OTHER.



Photo 2: Relatively well preserved close-packed pillows in post-ore (Group C) volcanites. The dark pillow rims are visible around the pale pillow centres. Note the weathered out epidote+calcite concentrations near the pillow centres.  $S_3$  cleavages are well developed in these concentrations. The Lens cap is for scale.



Photo 3: Extremely flattened pillows within pale-green, post-ore (Group C) volcanites from the immediate footwall to the main ore zone. The flattened pillows occur to the right of, against a greyish, pot-bearing quartzites (recrystallizing chert). Note the thin flattened and stretched dark chloritic pillow rims. From mine level 500 synk area, profile B<sub>2</sub>-5 to 9 (J. Olsen 1976 mapping area).



Photo 4: Small pillows or pillow breccia fragments set in darker green chloritic hyaloclastite matrix from the Group C<sub>1</sub>, post-ore, paler greenstones. Located in the river, NE of the open pit and the 'elvegangen' ore horizon.



Photo 5: Pale, pillow breccia fragments set in dark, Fe-chloritic hyaloclastites, from the intensely altered, pre-ore (Group B) volcanites series west of the open pit, near the surface locality JD 23/84 (Fig. 4.2b).



Photo 6: Thinned part of main ore zone (Cu-rich, cp-po-py ore) separating dark chlorite and albite rich schists in the hangingwall from schistose, post-ore, pale greenstones (Group C<sub>1</sub>) in the footwall. The cp-po-py ore zone lies along a major D<sub>2</sub> thrust plane. (From 500 Synk, J.Olsen 1976 mapping area).

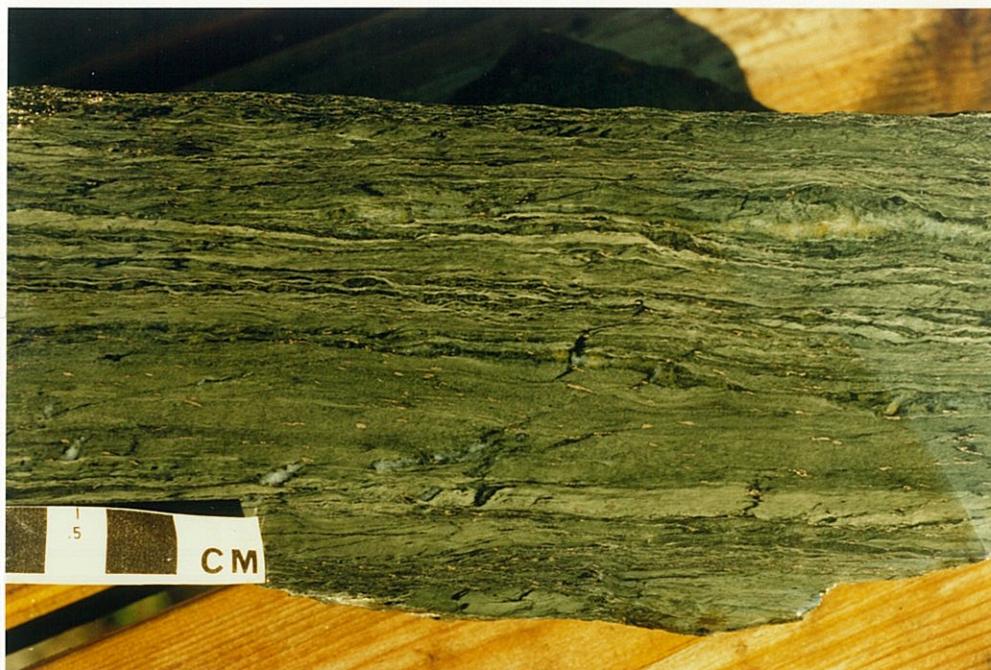


Photo 7: Strongly altered, pre-ore volcanites, Group B<sub>3</sub>, as moderate green, albite+Fe-chlorite rich schists (slightly more massive) with large, elongate, pinkish-brown pyrrhotite grains. Minor epidote+quartz rich lenses occur to upper right hand corner. From 387 ØL locality no. 2 (see Fig. 4.3).

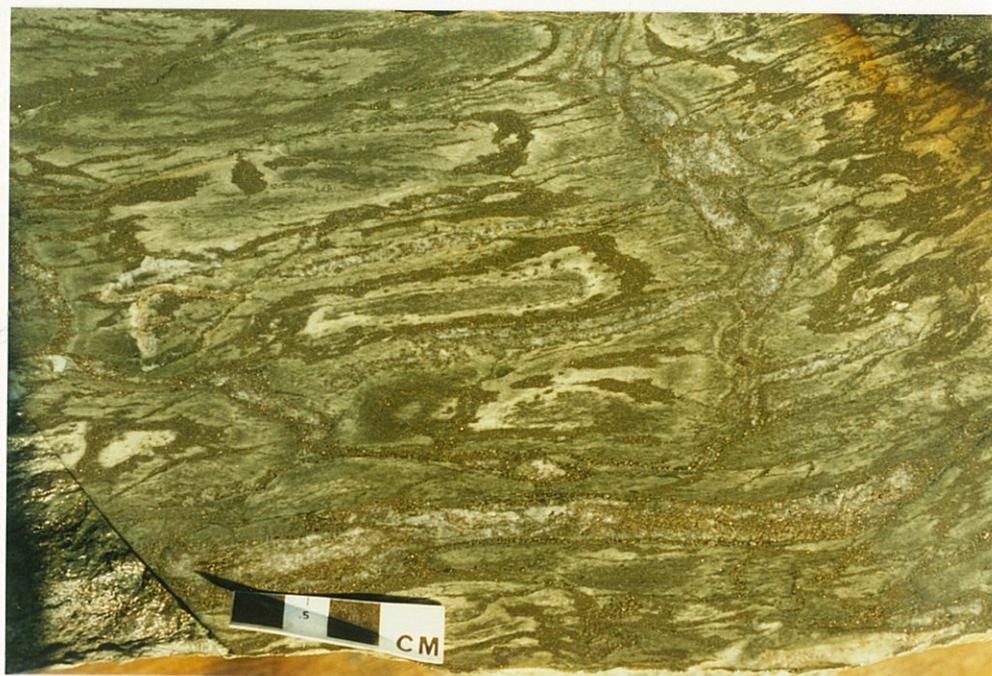


Photo 8: Strongly altered, pre-ore volcanites, Group B<sub>4</sub>, pale to apple green coloured, fine grained albite+sericite+chlorite schists with much fine grained disseminations of pyrite and interconnected veins of coarse grained pyrite and quartz. Note the zoned nature surrounding the pyrite veins. From surface locality JD 15/84 at NW corner of open pit (see Fig. 4.2b).



Photo 9: Strongly altered, pre-ore volcanites, Group B<sub>2</sub>, pale greyish-green, albite+sericite rich rock with visible thin interconnected veins of po+py. From west side of open pit (see Fig. 4.2a+b).



Photo 10: Intensely altered, pre-ore volcanites (Group B<sub>4</sub>), actinolite bearing, pale albite+sericite+chlorite schists with flattened (sheared) large pyrite veins and associated carbonate. This represents the upper lateral part of a feeder zone. From 375 ØF level, locality 114-116 m (Fig. 4.6a+b).



Photo 11: Irregular, pale-white, albitite+pyrite layered rock (type B<sub>5b</sub>) underlying po-cp disseminated, biotite-bearing dark-green Fe-chlorite schists (type B<sub>6c</sub>) and yellow coloured, Cu-rich, massive cp-po breccia ore (type IIIa). The pale albitite-pyrite unit lies with sharp tectonic (thrust) lower contact, at pencil, above a Zn-rich, calc-bearing massive pyritic ore (type IVa). From 385 VF.s.strosse locality 8-10 (Fig. 4.4b).



Photo 12: Slab of layered, pale to white albitite-pyrite rock (type B<sub>5b</sub>) showing tectonic lensoid nature of the white albitite layers and the darker zones rich in finely disseminated pyrite grains. The black strips are rich in biotite. Note the coarse grained, flattened, vein-like pyrite concentrations. From 385 VF.s. strosse locality no. 8 (see Fig. 4.4b).



Photo 13: Massive, dense, hard, pale to white albitite with numerous interconnected quartz-pyrite veins (sub type B<sub>5a</sub>). From immediately west of open pit, locality JD-30a/84 (see Fig. 4.2a+b).



Photo 14: Fragmental, zoned structures in pale albitite (sub type B<sub>5b</sub>) surrounded by thicker concentrations and veins of coarse grained pyrite. The zoned structures within the albitites is interpreted as a hydrothermal alteration phenomena representing decreased alteration and pyritization moving away from the fractures and pyrite veins? From Mills ort, St.Ort 510-520.

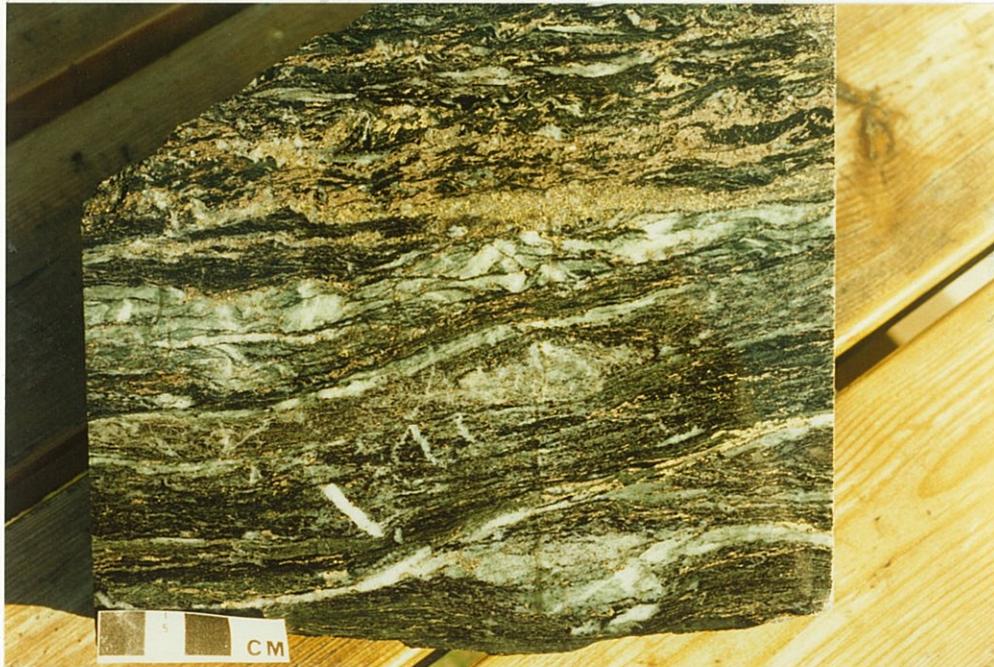


Photo 16: Slab of slightly more massive, moderate dark, albite rich and biotite bearing chlorite schists sub type B<sub>6a</sub>. Rich in cp-po disseminations and tectonic concentrations. From 388 VF. Led ort locality 4 (see Fig. 4.5a+b).



Photo 15: Fine layered pale albitite and dark chlorite schists sub type B<sub>5c</sub> interpreted as primary chemical-sedimentary layering. Shows F<sub>3</sub> type crenulation folds. From 500 synk area (J. Olsen, 1976 mapping area).

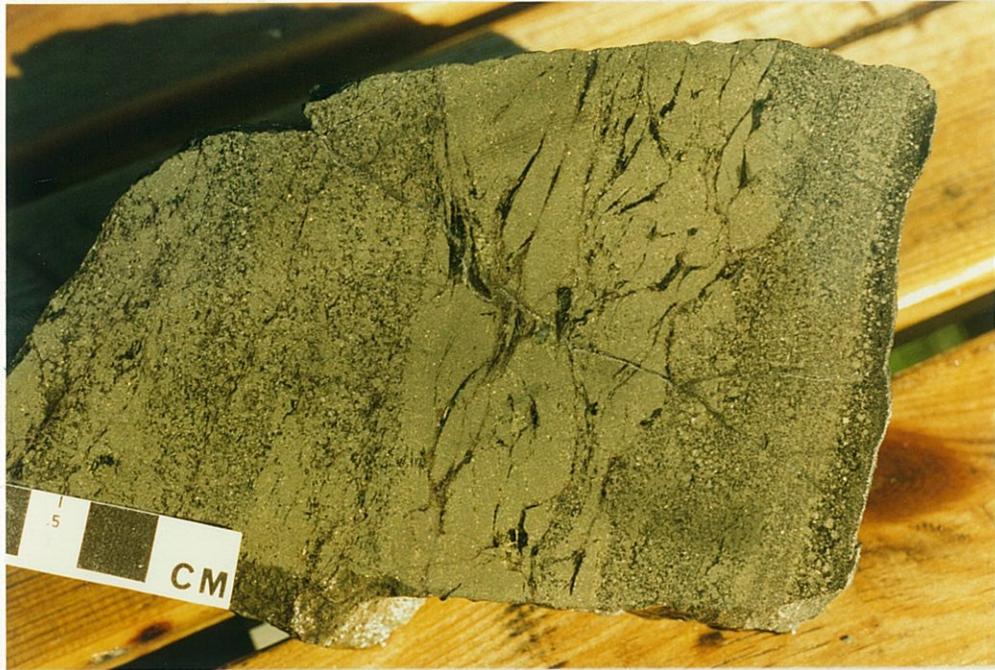


Photo 17: Fine grained, Cu-rich pyritic ore (type II<sub>A</sub>) surrounded by coarse grained, calc bearing pyritic ore (sub type II<sub>C</sub>). Fractures (D<sub>3</sub>?) are filled with secondary, remobilized dark amphibole and po+cp.



Photo 18: Well-layered, Cu bearing massive py-po ore (pale layers) with thin (cm thick) darker layers rich in amphibole ore facies II<sub>d</sub>. From west wall of 387 VF.s.strosse.



Photo 19: Black magnetite rich layers and fragments (tectonic lenses) set in a fine to medium grained, Cu-rich pyritic ore (sub facies II<sub>mt</sub>).



Photo 20: Well-layered, Cu-rich, cp-po-py ore and darker chlorite and amphibole rich interlayers - interpreted as primary chemical sedimentary layering from the interface level between the Fe-chlorite schists and stratigraphically overlying Cu-rich massive ores. Note the isoclinal and flattened  $D_2$  minor folds. From bottom of 375 ØF synk level, locality no. 6 (see Fig. 4.6a+b).



Photo 21: Zn-rich, medium grained, massive pyritic ore (sub facies IVa) with thicker irregular layers and concentrations of dark brown sphalerite (note pencil for scale). From 416 level.



Photo 22: Slab of medium to coarse grained, Zn-rich pyritic ore (sub facies IVa) with dark brown irregular shadows of sphalerite rich and paler fine to medium grained pyritic ore. Contains much carbonate as matrix. From open pit, locality JD 44/84 (Fig. 4.2a+b).



Photo 23: Slab of coarse grained, Zn-rich massive pyritic ore (sub facies IVa) showing strong tectonic layering - brown layers rich in sphalerite and pale to white layers and lenses rich in carbonate. From 375 ØF 39 (see Fig. 4.6a+b).



Photo 24: Thin layer of Zn-rich, medium grained massive pyritic ore (sub facies IVd) with lensoid white quartzite - tectonic remnant of recrystallized chert. This is a tectonically thinned pyritic layer that penetrates into the pale green schists (type B<sub>4</sub>). (Note pencil for scale.) From 375 ØF area above locality 45 (see Fig. 4.6a+b).



Photo 25: Slab of greyish-brown coloured, Zn and carbonate rich massive pyritic ore (sub facies IVb). Contains typical thin black amphibole porphyroblastic needles showing some strong alignment parallel to  $S_3$ . From 385 VF.s.strosse local. 21 (see Fig. 4.4a+b).



Photo 26: As photo 24, slab of layered, Zn and carbonate bearing massive pyritic ore (sub facies IVb). Layered distal slump breccia type. The darker layers contain small reddish-brown oxidized (hematite rich?) fragments. Note the black amphibole porphyroblastic needles. Same locality as photo 24.



Photo 27: Slab of slump breccia type, Zn- and carbonate rich massive pyritic ore (sub facies IVb). The darker greyish fragments are rich in carbonate and finely disseminated pyrite. The thin white limestone layers show remnants of isoclinal fold hinges which attest to a tectonic nature of some of this ore. From west side of open pit, local. JD 28/84 (see Fig. 4.2a+b).



Photo 28: Slab of Zn-rich, coarse grained (massive to semi-massive) pyritic ore (sub facies IVc), with thin, dark layers of chlorite and much chlorite and carbonate as matrix to the sulphides. From the bottom of 375 ØF synk locality no. 13-b, occurring at the stratigraphic top of ore zone, above the Cu-rich ores and beneath the layered post-ore (Group C<sub>2</sub>), pale greenstones (see Fig.4.6a+b).



Photo 30: Chlorite+carbonate bearing, magnetite rich, dark quartzite (recrystallized chert) fold hinge remnants ( $F_2$ ) set in Cu-rich, po-cp-py+chlorite bearing ore (sub facies IIe). Note the flow structures within the sulphides around the broken and rotated, more competent chert units which originally formed thicker consistent primary layers. From 385 VF.s.strosse (see Fig. 4.4a).

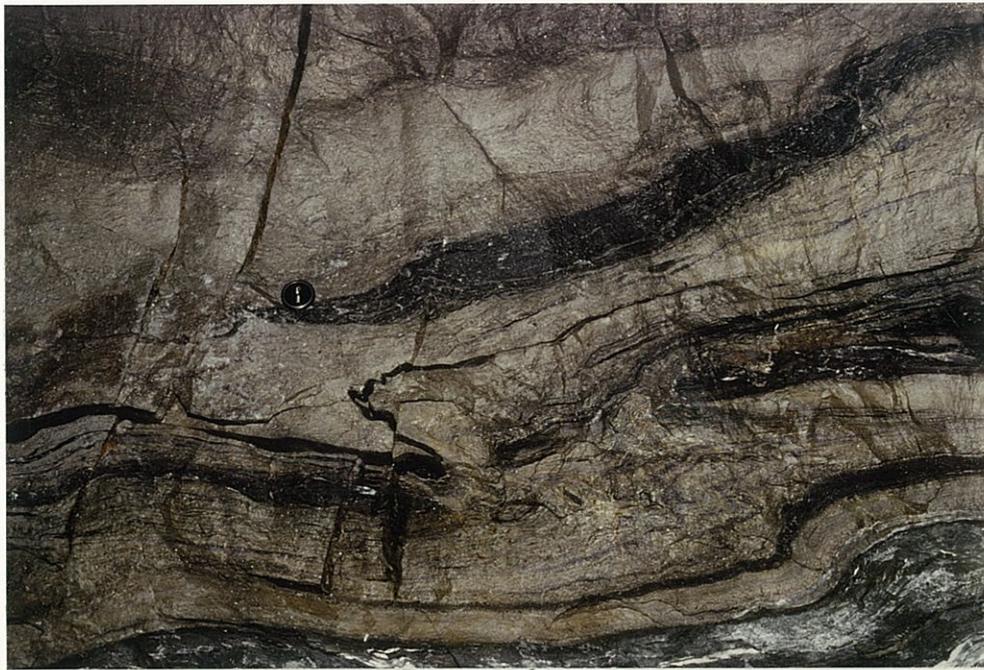


Photo 29: Thin, dark chlorite rich schist layers within layered Cu-rich, cp-po-py ore (sub facies IIe). The thicker, black, magnetite rich quartzite layer (recrystallized chert), at the lens cap, marks the boundary to the above lying Zn-rich massive pyritic ores (sub facies IVa). From 385 VF.s.strosse locality no. 20 (see Fig. 4.4a+b).



Photo 31: Dark, chlorite schist layer (max. 50 cm thick) separating fine grained massive pyritic ore (type I) above from somewhat layered - thin white limestone horizons and brownish Zn-rich massive pyritic ore (type IVa) below. The chlorite schist lies along a local  $D_2$  thrust structure. Note the pinch and swell and  $D_3$  folding of the upper chlorite schist surface. From 416 level.



Photo 32: Shows  $D_3$  folded contact between uppermost medium grained, pyritic ore (facies IVa) bearing thin white limestone and thicker dark chlorite schist layers and below lying yellow coloured, coarse grained, Cu-rich cp-po breccia ore below (facies IIIa). From 500 synk area (J. Olsen 1976, mapping area).



Photo 33: Shows thicker layers of white limestone-marble within Zn-rich pyritic ore (facies IVa). Much of layering is due to tectonic repetition by  $F_2$  folding and thrusting. Note isolated recumbent  $F_2$  fold hinge remnants with axial planes paralleling the main tectonic layering. From 387 VF.s.strosse west long wall.

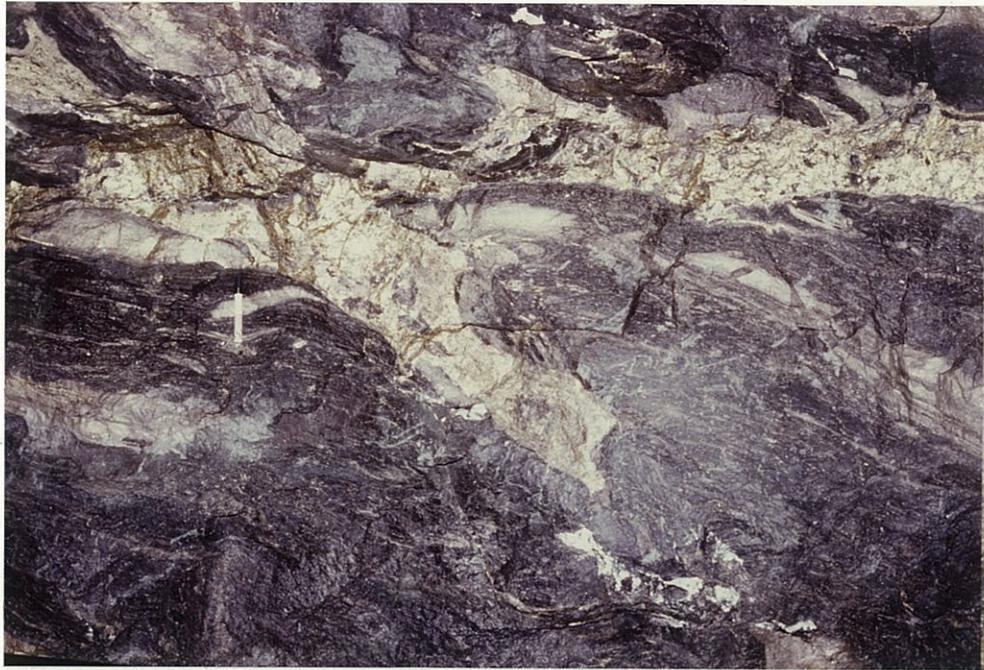


Photo 34: Yellow coloured, Cu-rich, cp-po breccia ore (type IIIa) cutting through dark chlorite schists and thin layers of Zn-rich massive pyrite ore along major thrust structure. Note the undulating  $D_3$  folded upper surface of the cp-po breccia ore horizon and the hint of a piercement structure at bottom ore surface to right of felt pen. From 350 level (photo courtesy by N. Odling).



Photo 35: Thick sequence of cp-po breccia ore (facies IIIa) with numerous large angular to smaller subrounded fragments of dark chlorite schist floating in cp-po rich matrix. (Note felt pen for scale, 10 cm long.) From same locality as photo 34.

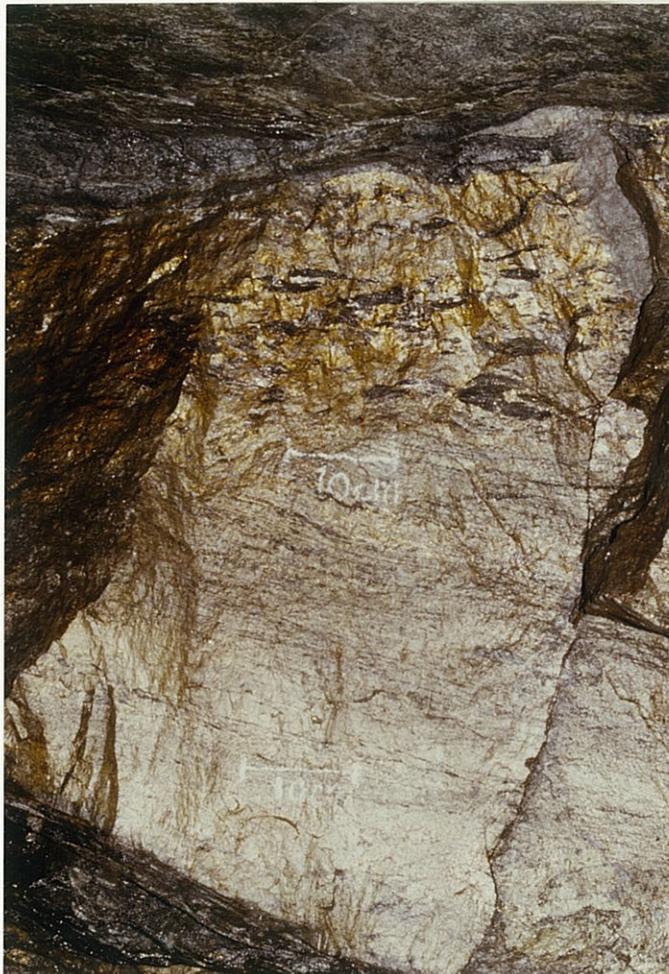


Photo 36: Massive sulphide horizon composed of thin layered amphibole rich, Cu bearing, py-po ore (type IID) with minor thin, black magnetite bands overlain by a Cu-rich, cp-po breccia ore horizon (upper 25-30 cm, above upper 10 cm mark) containing numerous elongate black magnetite ore fragments. From 387 ØL, local. 3 (see Fig. 4.3).



Photo 37: Footwall contact to the Joma massive sulphide horizon which is composed of a lower 30 cm to 1 m thick irregular cp-po breccia ore (facies IIIa) overlain by a thicker grey coloured Zn-bearing pyritic ore carrying thin white limestone and dark chlorite bands. The cp-po breccia ore, contains numerous large, elongate to small, rounded dark chlorite schist fragments. The chlorite fragments are aligned at an angle to and truncated by the sharp lower thrust contact ( $D_2$ ) that separates the massive ore from the footwall schistose pale greenstones (Group  $C_1$ ). From 500 synk area (J. Olsen, 1976 mapping area).



Photo 38: Fifty cm thick layer of Cu-rich, cp-po breccia ore horizon which contains large elongate fragments of white limestone-marble and dark chlorite schist plus irregular white quartz segregations. Small rounded fragments of dark chlorite and clear glassy quartz are also seen. This cp-po breccia zone occupies the thrust boundary at the base of the main ore zone midway down 375 ØF synk ca. locality no. 61 (see Fig. 4.6a+b).



Photo 39: Thick, irregular, Cu-rich, cp-po breccia ore zone which contains numerous irregular dark chlorite fragments and fold hinge remnants of white limestone-marble (at finger). From 500 synk level (J. Olsen 1976, mapping area).



Photo 40: Slab showing cp-po breccia ore with contact against dark Fe-chlorite schist with numerous layers and disseminations of cp+po. Some of the rounded, elongate chlorite schist fragments show remnants of  $F_2$  fold hinges and are rotated. Note the coarse grain size of the cp-po matrix.



Photo 41: Slab of cp-po breccia ore (facies IIIa) with contact against layered chlorite schist and coarse grained pyrite. Note the rounded fragments of layered chlorite+pyrite and fine grained pyritic ore down to the right.



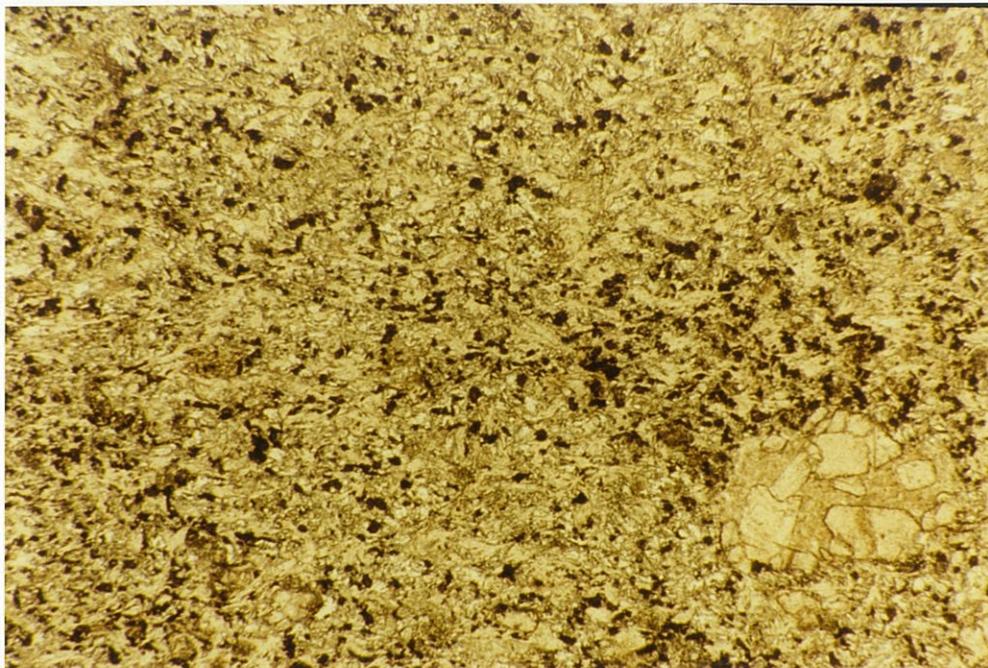
Photo 42: A 1 m thick layer of Cu-rich, partly cp-po breccia ore horizon lying along a major local thrust plane that truncates a greyish po-impregnated quartzite lens (chert) and paler green, actinolite and pyrite-bearing pale schists (Group B<sub>4</sub>) below the quartzite. An irregular, black, magnetite-rich zone occurs within the quartzite to right, above the lens cap. Note the sharp tectonic contact at the base of the Cu-rich ore zone. From 387 ØL area (see Fig. 4.3 at 6-8 meters).



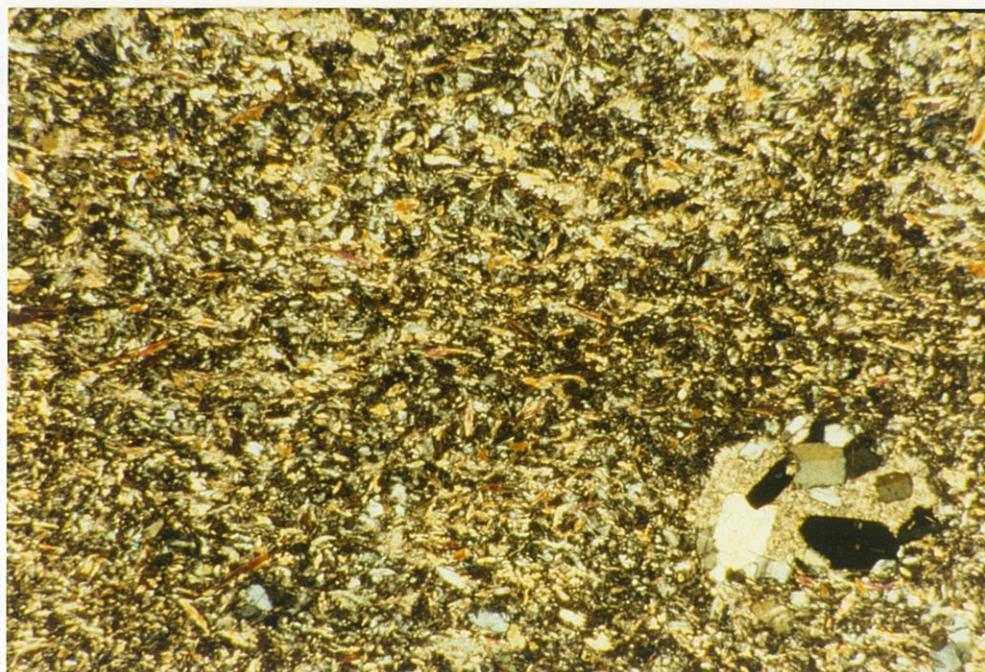
Photo 43: Massive sulphide ore horizon separates hangingwall dark chlorite schist from footwall post-ore schistose, pale greenstones (Group C<sub>1</sub>). The ore and host rocks are folded by a large upright F<sub>3</sub> crenulation type fold in which the bottom contact of the massive ore is brought down into a piercement structure that penetrates the footwall pale greenstones to right of J. Olsen. From 500 synk area (J. Olsen 1976).

APPENDIX I

I.1 TWENTY-FOUR MICROPHOTOGRAPHS OF THE HOST ROCK TYPE SILICATE ROCKS.



(a)

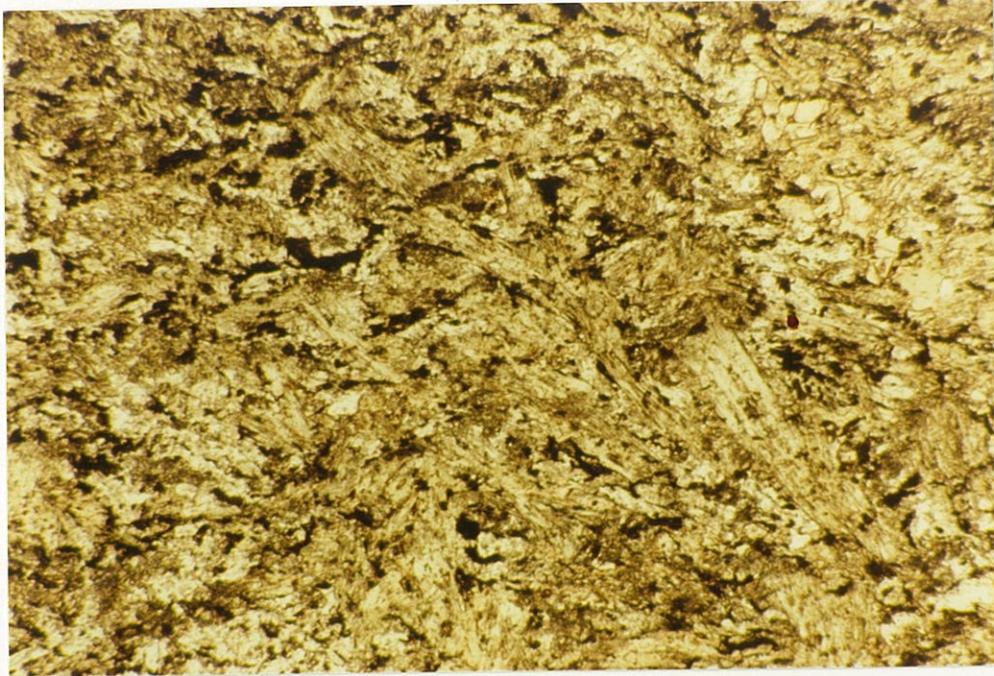


(b)

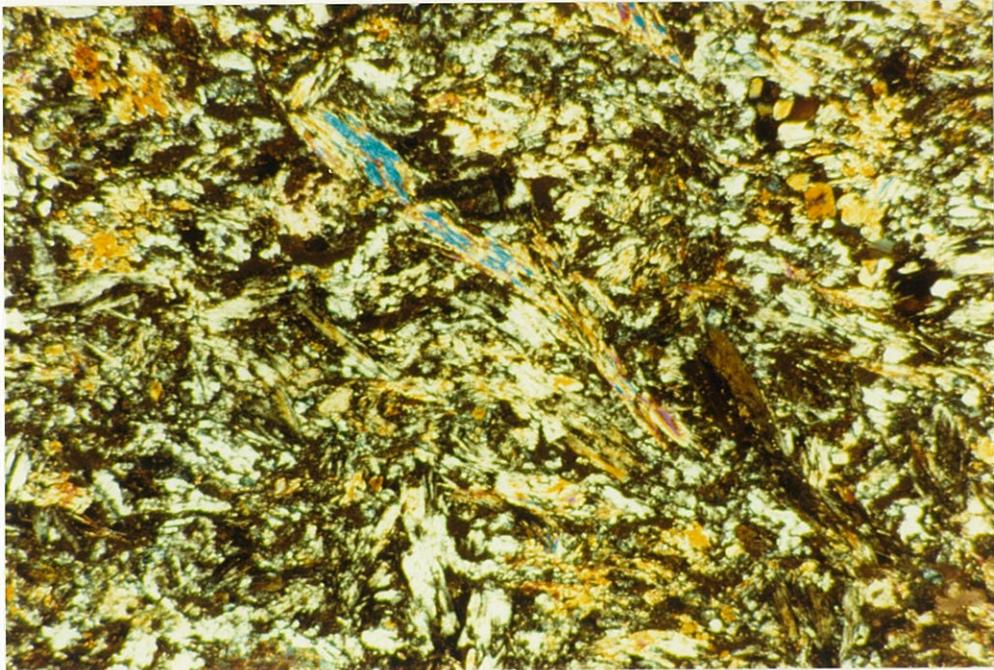
Microphoto 1: Distal Greenstone (Group D). Pillowed metabasalt.  
(Sample JD-1/84; Solberg I, south of Joma).

a) A very fine grained ( $<0.2\text{ mm}$ ) metabasalt with a typical sub-ophitic texture of altered albite laths and larger patches of fibrous, pale green chlorite (after pyroxene?) and large randomly oriented, elongate needles of pale, fibrous actinolite (0.2 mm long) set in a finer matrix of chlorite and albite. Darker, brownish grey patches of leucoxene (sphene) and minor opa grains (opaque) are found associated larger, sub-rounded grains of yellowish epidote (clinzoisite) and chlorite. The leucoxene is composed of finely disseminated sphene crystals and opaques. Minor epidote grains and patches of calcite are also seen widespread.

b) X-nicols (Photo edge = 2 mm).



(a)

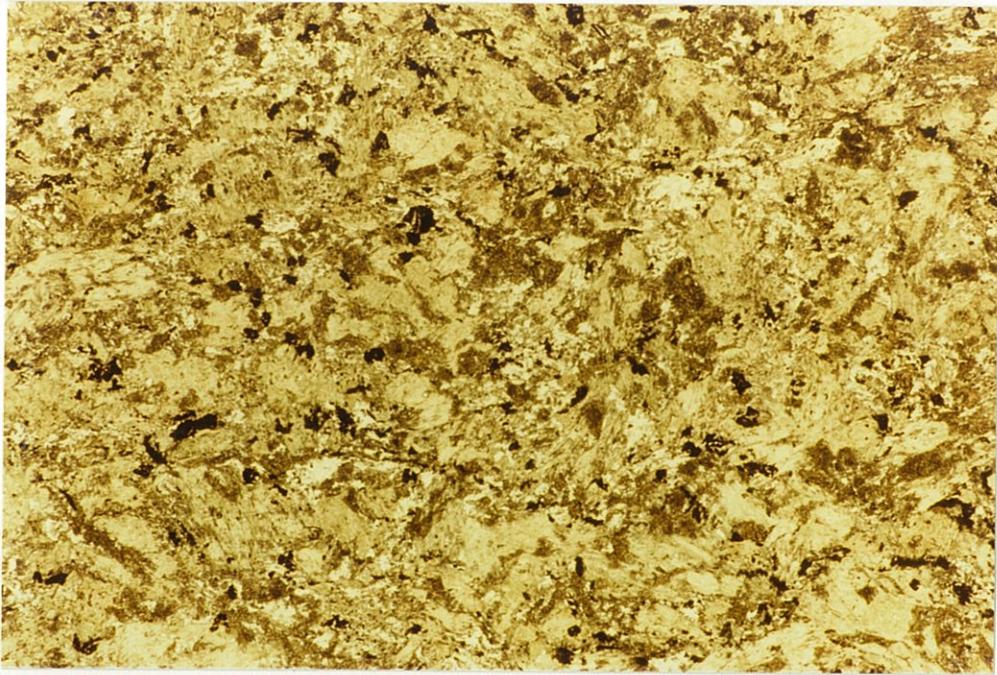


(b)

Microphoto 2: Distal Greenstone (Group D). Pillowed metabasalt  
(Sample JD-9/84; Orklumpen).

a) A coarser grained metabasalt with a sub-ophitic texture of randomly oriented, 0.7 mm sized, pale albite laths and larger patches of moderate green chlorite and elongate needles of actinolite are the major components. Minor, sub-rounded grains of pale yellowish epidote are seen associated within darker grey-brown patches of leucosene (sphene) and rounded grains of pyrrhotite (opaque).

b) X-nicols (Photo edge = 2 mm)



(a)

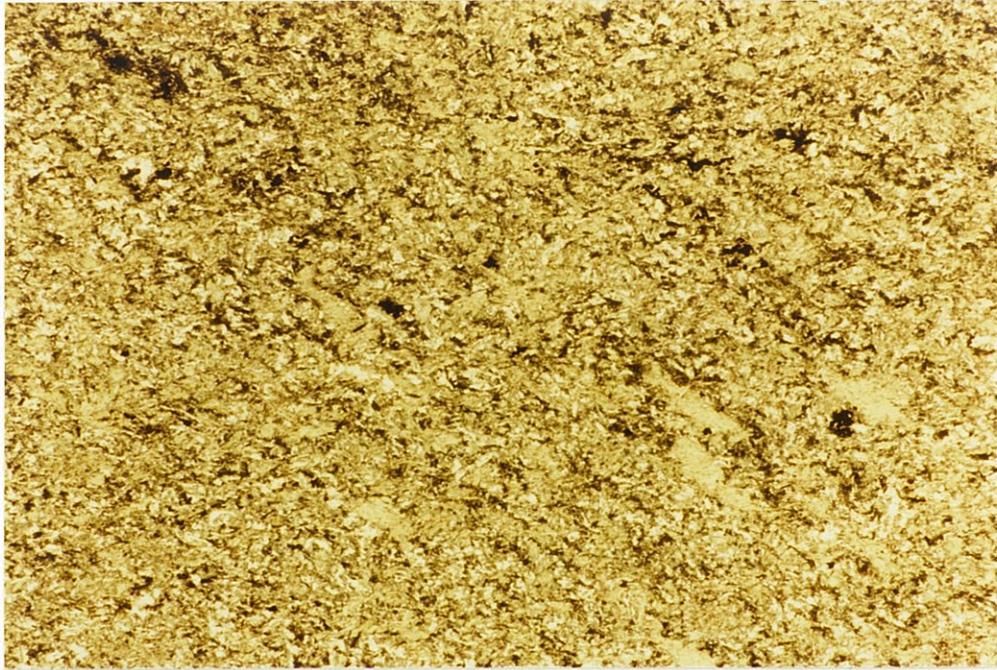


(b)

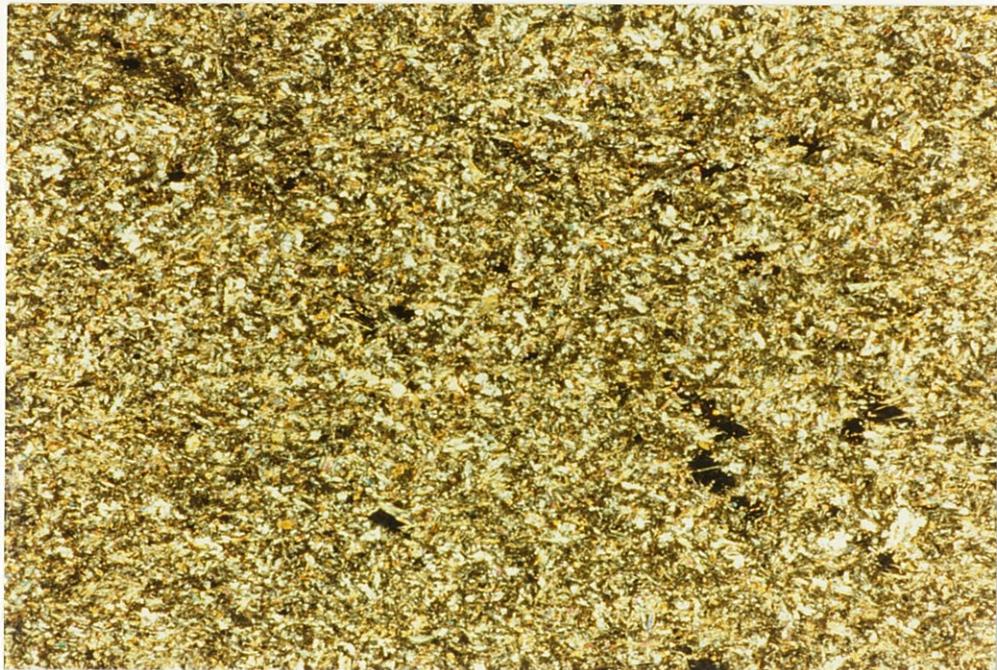
Microphoto 3: Massive volcanite, ferrobasalt (Group A)  
(Sample D39-16) or D39?)

a) A medium to coarse grained metaferrobasalt with sub-ophitic texture - sub-randomly oriented albite laths set in larger patches of dark green Fe-chlorite. Minor opaque grains (po) are associated the dark chlorites. Larger concentrations and knots of epidote are typical.

b) X-nicols (Photo edge = 6.8 mm.)



(a)

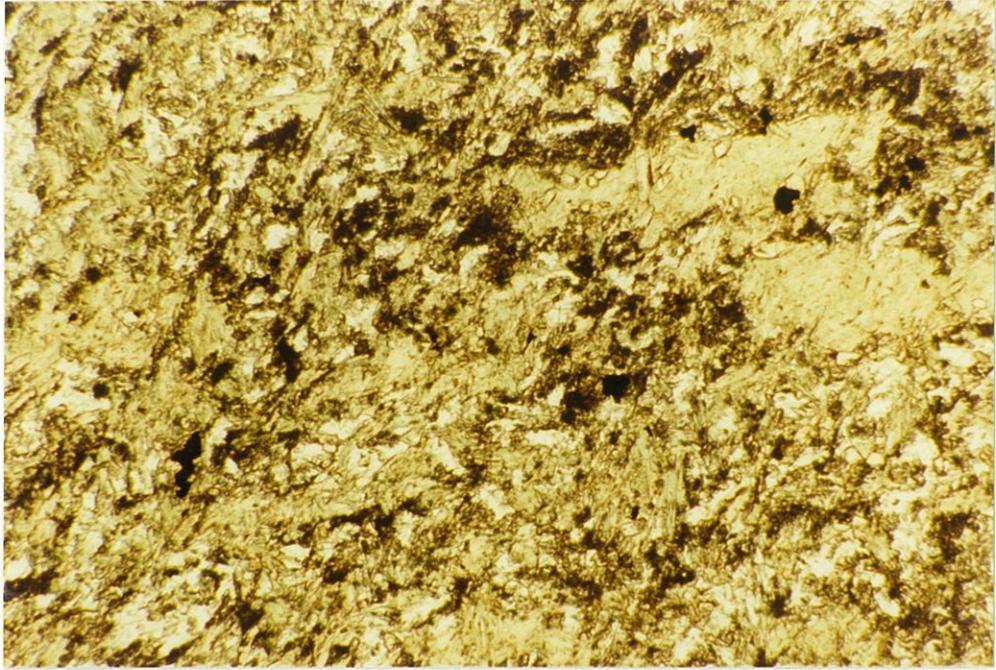


(b)

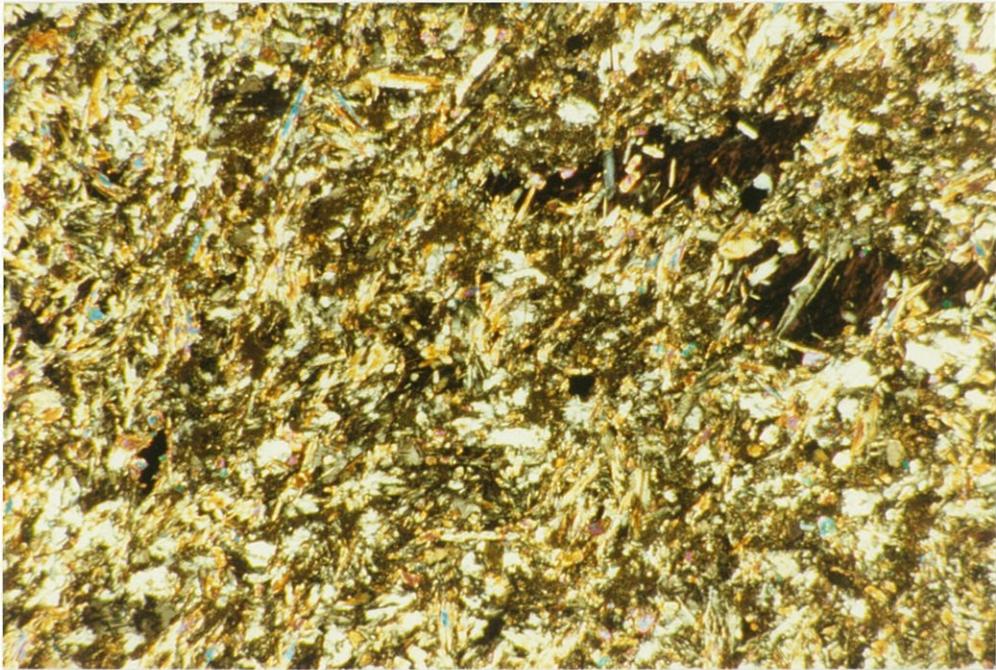
Microphoto 4: Dark chloritic, altered pillowed metabasalt (Group B<sub>1</sub>).  
(Sample JD-18/84).

a) A fine grained, moderately altered metabasalt with sub-ophitic texture. The section is composed mostly of dark-green patches of Fe-chlorite and minor grains of albite, actinolite, epidote, pyrrhotite and sphene. Minor elongate stubby crystals of epidote are found associated the larger disseminated grains of pyrrhotite (opaque). Numerous small irregular patches of dark sphene (leucoxene) are also seen.

b) X-nicols (Photo edge = 6.8 mm)



(a)

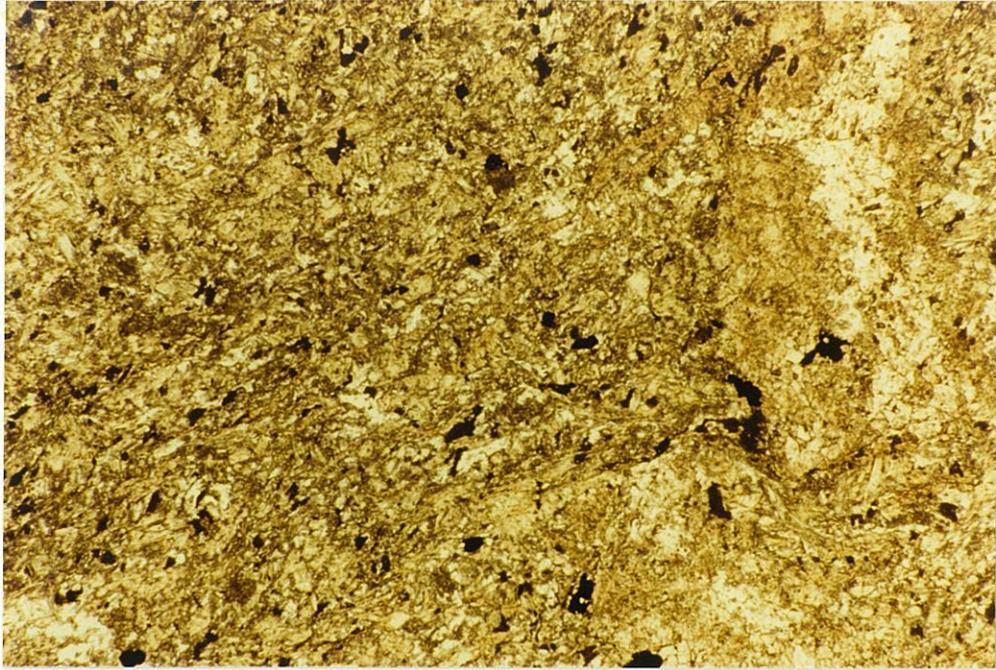


(b)

Microphoto 5: Dark chloritic, altered pillowed metabasalt (Group B<sub>1</sub>)  
(Sample JD-18/84) Larger magnification of Microphoto 4.

a) Shows subrandomly orientated albite laths and larger, dark green patches and matrix of Fe-chlorite. Minor, large elongate crystals of actinolite and patches of stubby epidote crystals and grains are visible. Note the finely divided (dusting) concentrations of minor leucoxene (sphene) and minor opaques (po).

b) X-nicols (Photo edge = 2 mm).



(a)

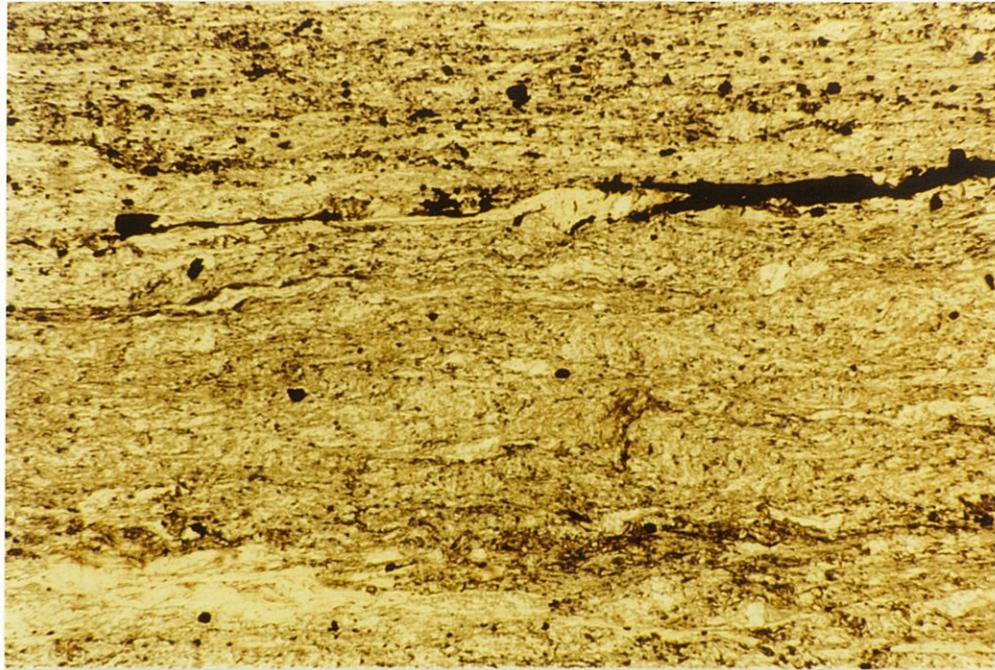


(b)

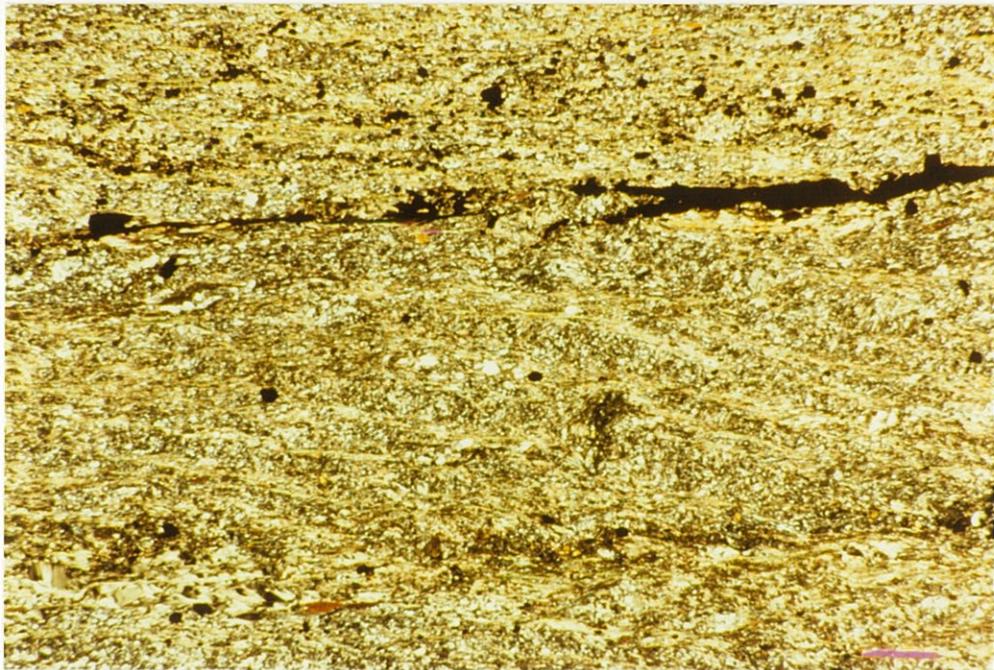
Microphoto 6: Group C<sub>1</sub>, post-ore, footwall pale greenstones.  
(Sample 388 VF.S.Strosse-5)

a) Medium grained, epidote and calcite rich, strongly altered pale metabasalt. The larger plagioclase laths and crystals are almost completely destroyed and altered to large patches of irregular, to sub-rounded grains of epidote (0.2 mm) and minor, large patches of calcite. Epidote occurs also as veins (i.e. paralleling bottom long edge of the photo). Minor patches of darker, brownish leucoxene ? is found associated with the minor, small irregular opaque grains (po).

b) X-nicols (Photo edge = 3.5 mm).



(a)



(b)

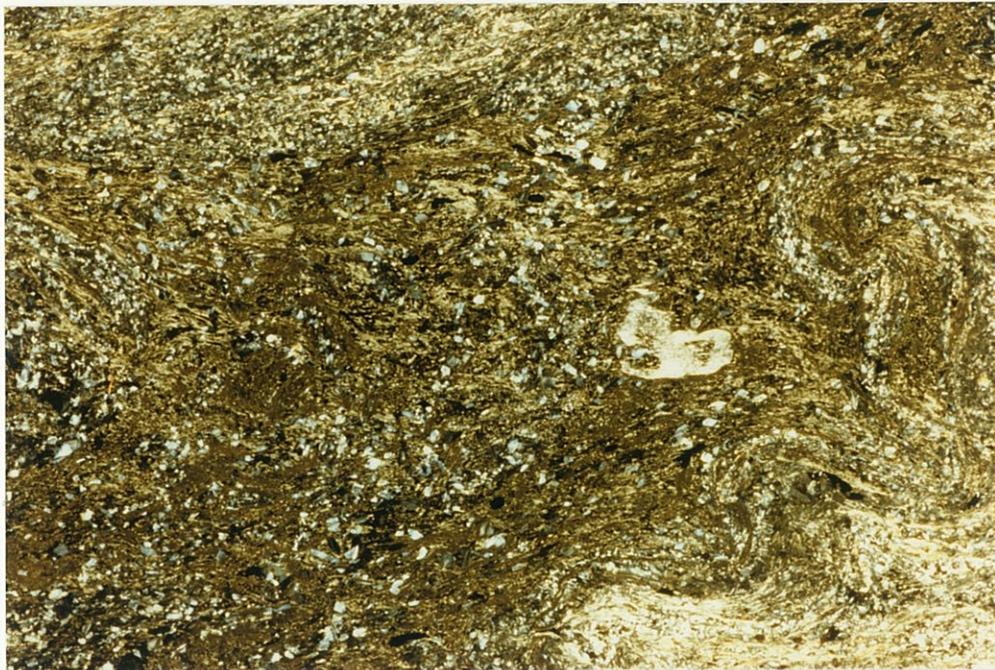
Microphoto 7: Group C<sub>1</sub>, strongly sheared, post-ore, pale greenstone.  
(Sample J0-12/84; Bh. 1781-18.20m).

a) A medium grained very schistose pale metabasalt, with a well developed S<sub>3</sub> cleavage that is marked by elongate chlorite growth, sub-parallel to the long edge of the photo. Note the remnants of rotated original volcanic textures and S<sub>2</sub> between the spaced S<sub>3</sub> cleavages. Minor elongated actinolite needles are aligned paralleling the prominent S<sub>3</sub> cleavage. Minor lensoid epidote knots and grains, and large, elongate opaque grains (po) parallel the main S<sub>2</sub> schistosity direction.

b) X-nicols (Photo edge = C. 2.8 mm).



(a)



(b)

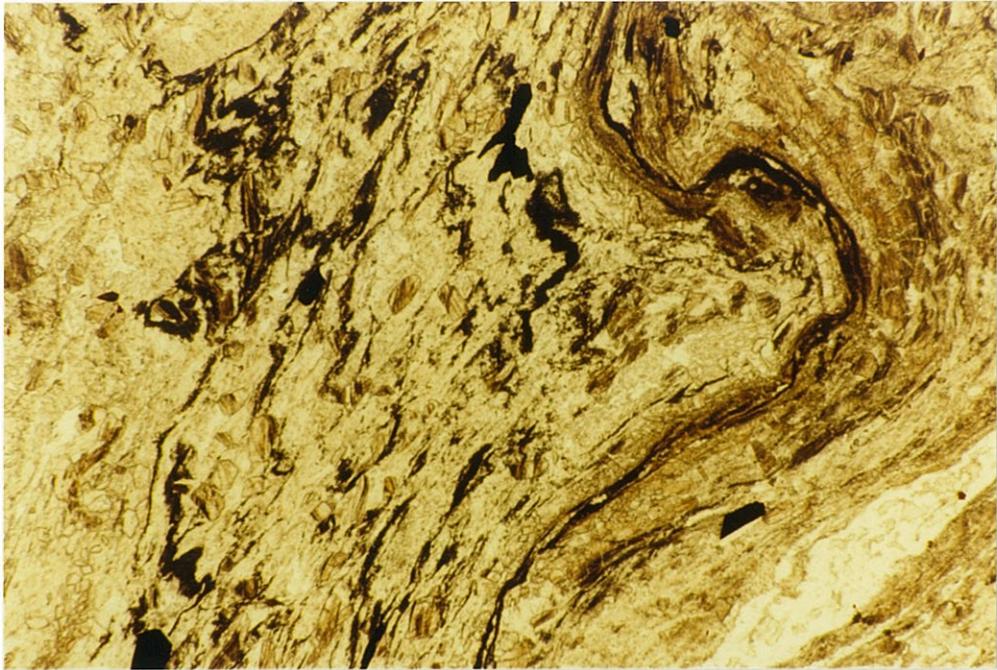
**Microphoto 8:** Hyaloclastite

(Sample J0-9/84; Bh. 1791-9.45 m).

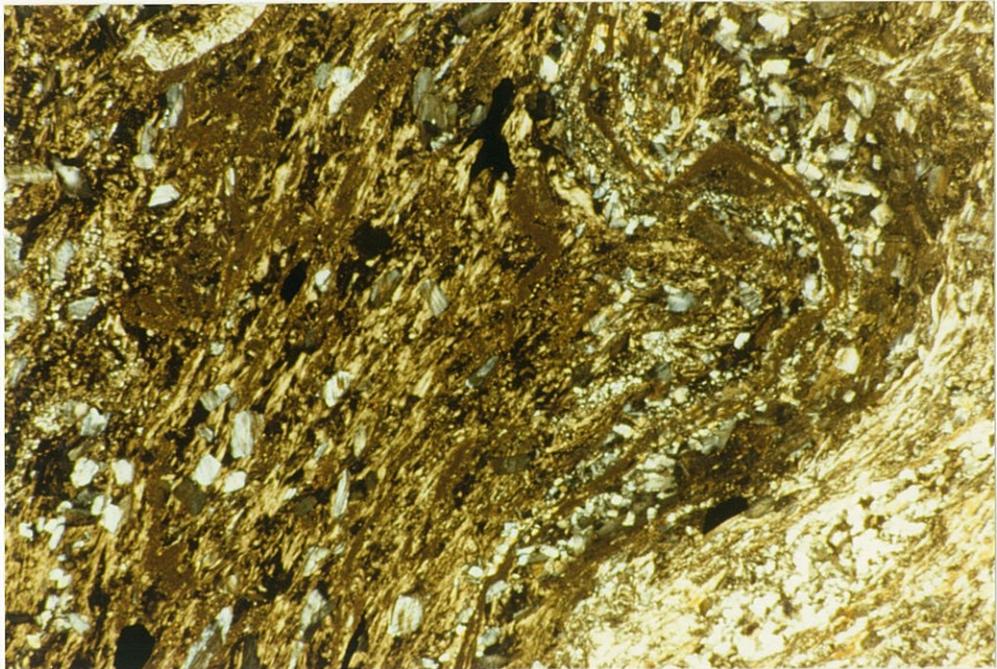
a) Well layered, chilled margins zone of pillowed rims and coarser grained hyaloclastite material between the fine grained pillowed metabasalt. The thin, dark brown layers are rich in very fine grained Fe-chlorite and very finely disseminated sphene. The black bands are rich in opaques (po?). The middle zone is composed of a coarser grained dark Fe-chlorite, bearing larger, stubby idiomorphic crystals of epidote (yellow) and albite (pale).

b) X-nicols Note the bluish-yellow interference colours for epidote.

(Photo edge = 11 mm).



(a)



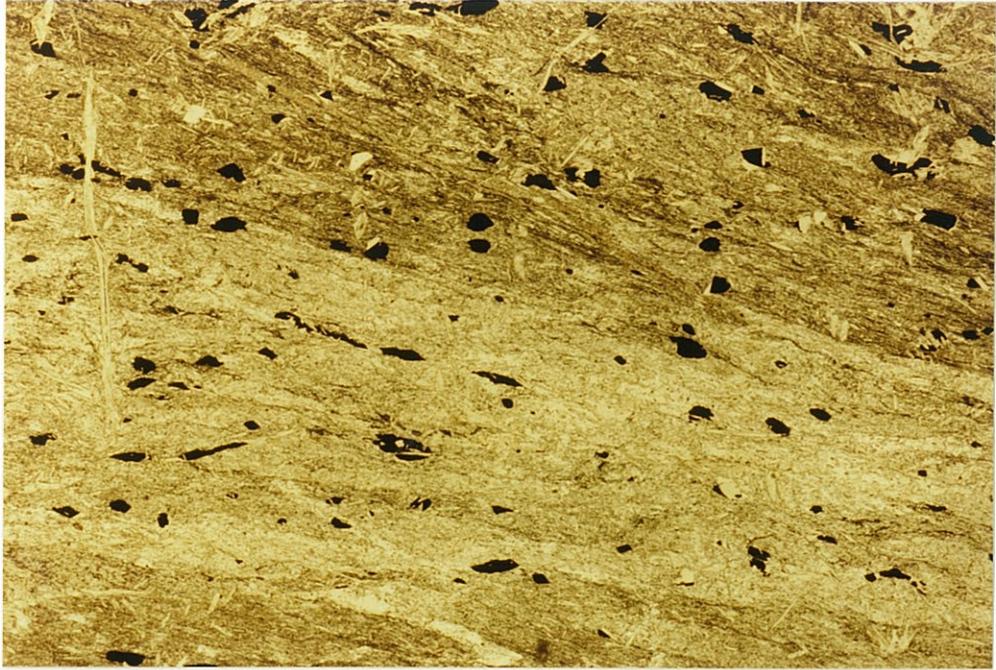
(b)

Microphoto 9: Hyaloclastite.

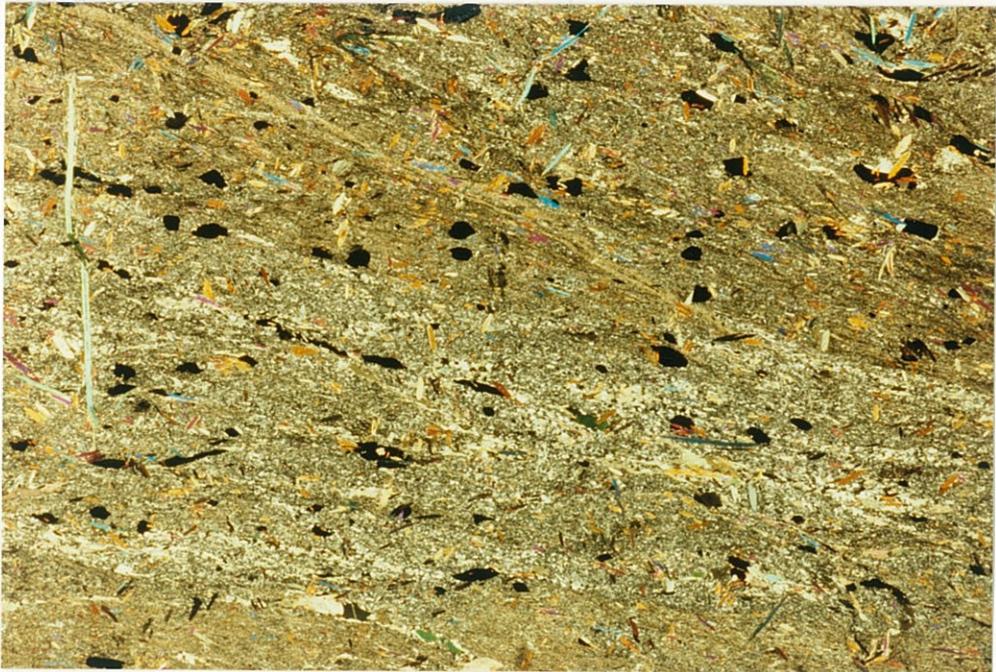
(Sample J0-9/84; Bh. 1791-9.45 m).

a) A close up view of the layered zones in microphoto no. 8. Shows the large stubby idiomorphic crystals of pale-yellow epidote, and darker, reddish-brown sphene? and pale-white, single twinned (X-nicols) crystals of albite.

b) X-nicols (Photo edge = C. 2.8 mm).



(a)



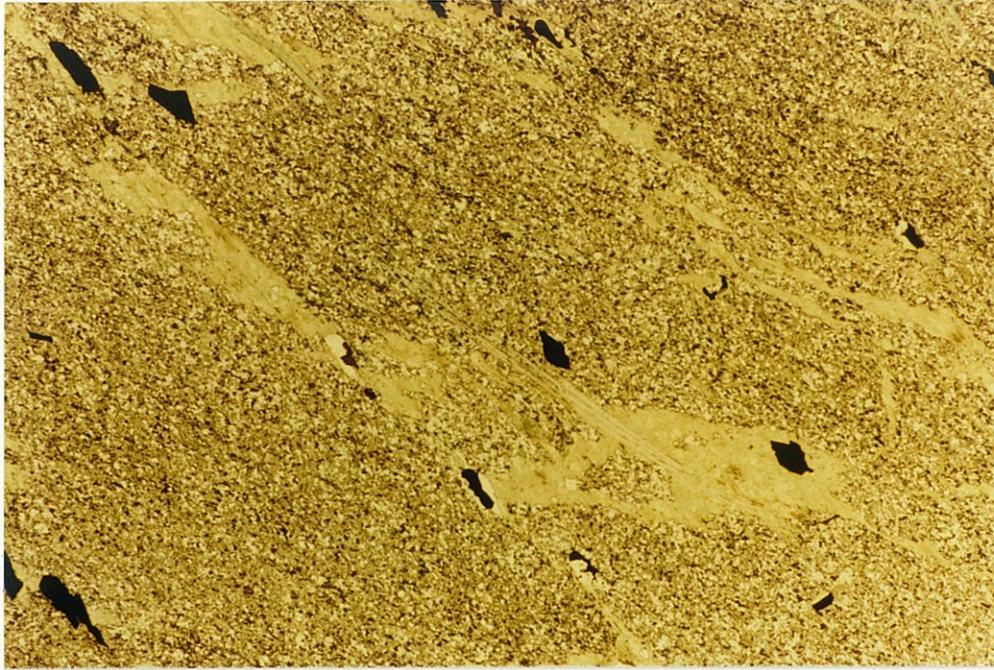
(b)

Microphoto 10: Group B<sub>2</sub>, po-bearing pale schists.

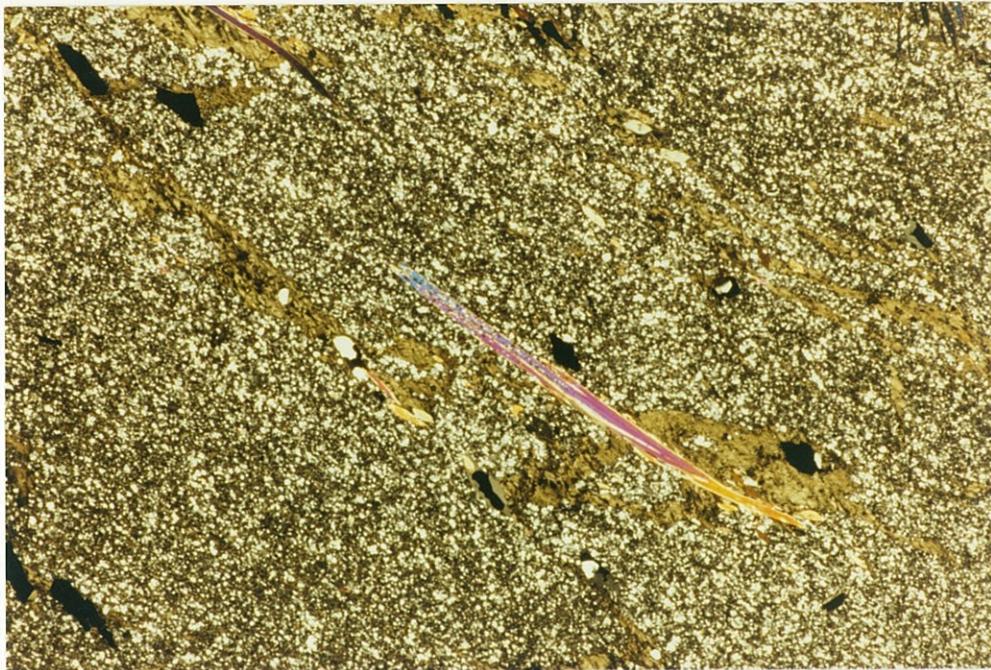
(Sample J0-14/84; 388 VF.St.Ort-1).

a) Strongly foliated, layered pale schists composed mostly of albite, sericite and chlorite with zones rich in dark chlorite and pale albite rich concentrations. Some remnants of epidote are seen. Minor amounts of large, elongate actinolite needles are found cross-cutting the main S<sub>2</sub> schistosity and paralleling the secondary S<sub>3</sub> cleavage. Much large opaque po grains are seen.

b) X-nicols (Photo edge = 11 mm).



(a)

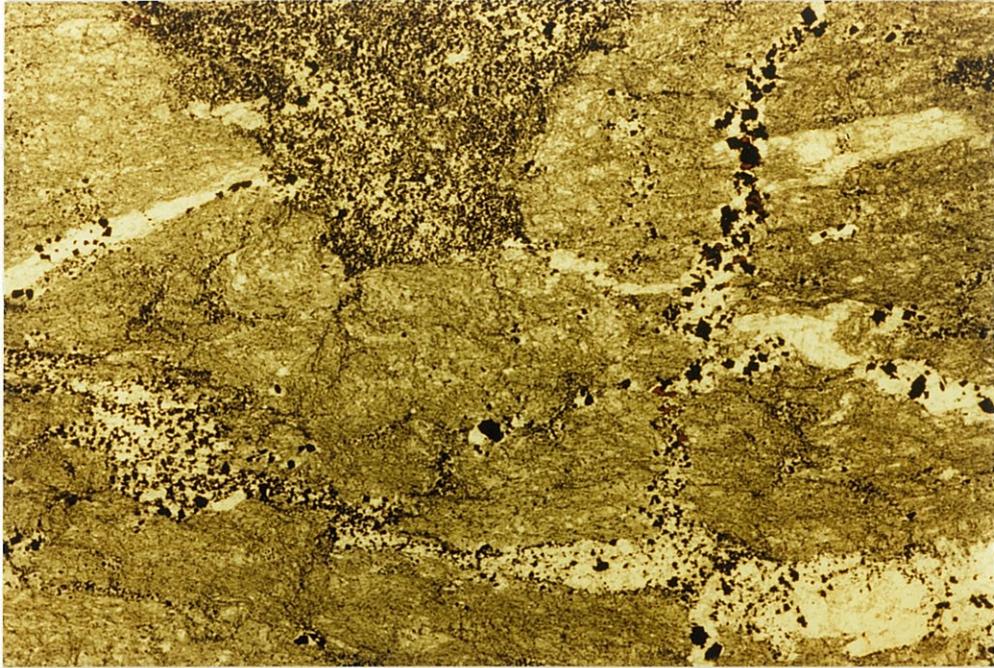


(b)

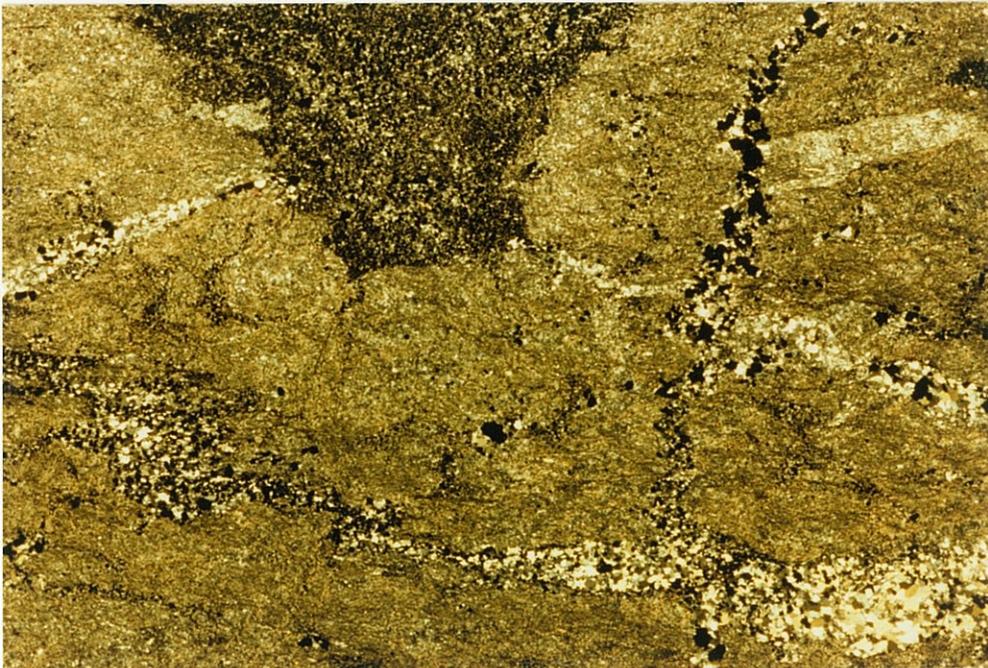
Microphoto 11: Group B<sub>3</sub>, moderate green, po-bearing ab+Fe-chlorite rocks  
(Sample J0-17/84; 385 VF.S.Strosse-5).

a) Large patches of medium-grained, dark green Fe-chlorite and paler zones (patches) of white albite within a matrix of finer grained dark chlorite. Large opaque po grains are associated with the dark chlorite. Diagnostic, large, elongate amphibole (actinolite?) crosscuts the main S<sub>2</sub> schistosity, aligned within the S<sub>3</sub> cleavage direction. Remnants and lenses of epidote are seen. Minor biotite and sericite occurs within the dark Fe-chlorite patches.

b) X-nicols (Photo edge = 6.8 mm)



(a)

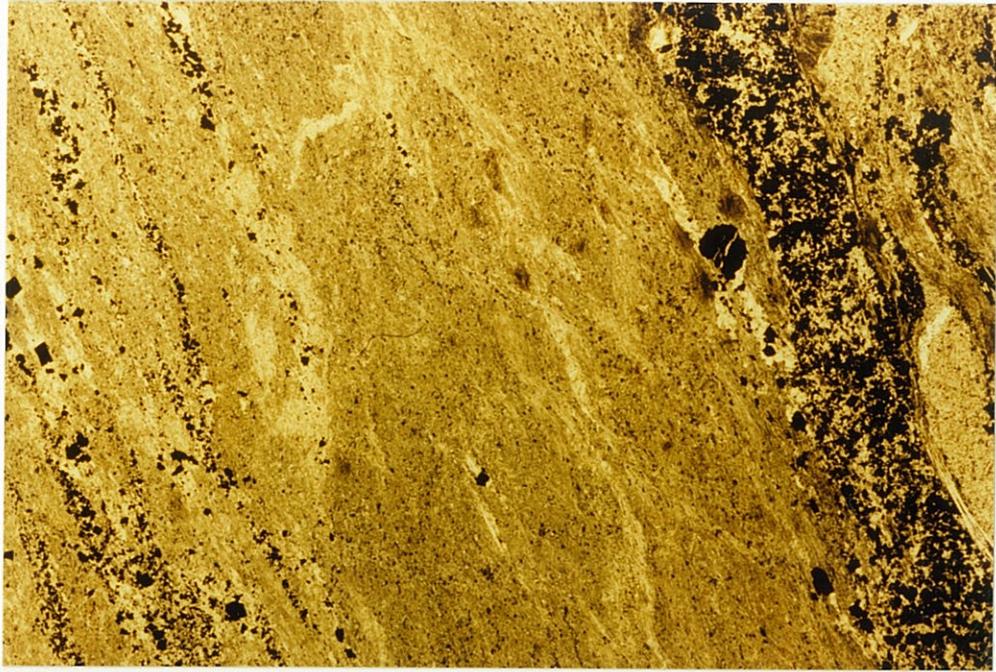


(b)

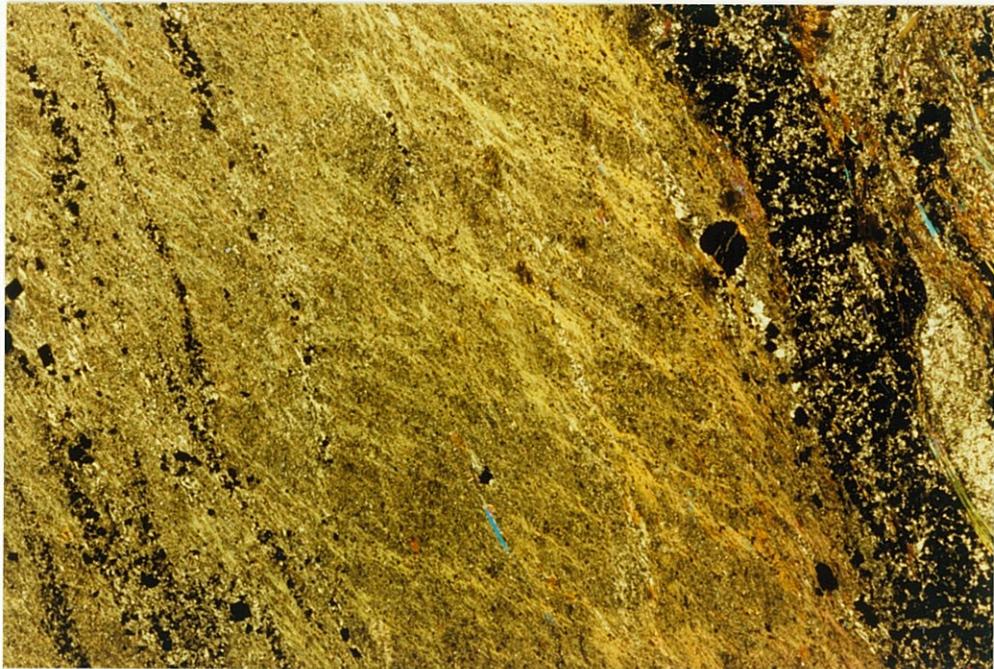
Microphoto 12: Group B<sub>4</sub>, pyrite-bearing, pale schists (apple-green coloured). (Sample J0-15/84).

a) Very fine grained, finely divided intergrown pale chlorite, albite and sericite with fine disseminations of pyrite (opaques) and sphene. Large darker patches contain dark chlorite and medium grained pyrite crystals. Larger veins are filled with quartz and coarser grained pyrite cubes (opaques) and minor brown sphalerite.

b) X-nicols (Photo edge = 11 mm).



(a)

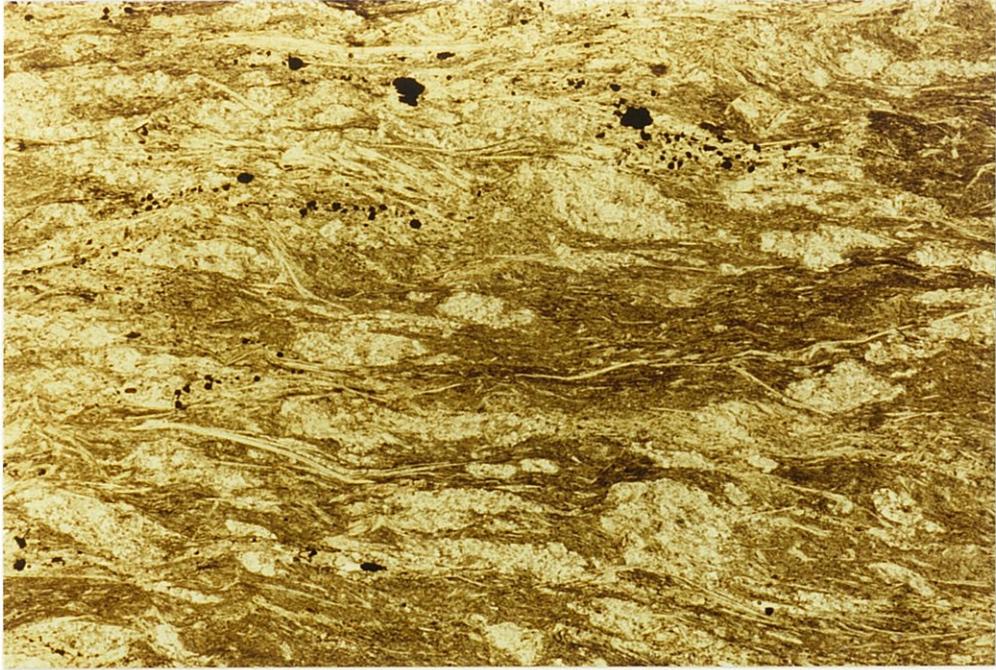


(b)

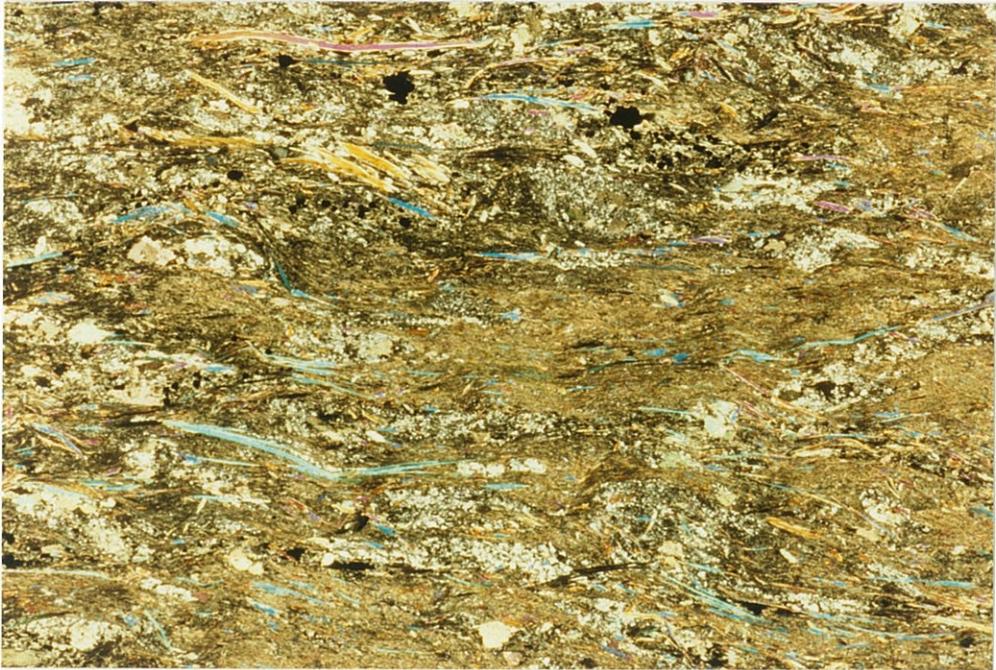
Microphoto 13: Group B<sub>4</sub>, pyrite-bearing, pale schists  
(Sample 375 ØF-41).

a) Fine grained intergrowths of pale chlorite, albite and sericite with minor actinolite needles. Note the very fine grained nature of the groundmass. Veins are filled with quartz, calcite, pyrite (opaque) and minor sphalerite (brown). A prominent S<sub>3</sub> crenulation cleavage is developed containing elongated concentrations of sericite.

b) X-nicols (Photo edge = 11 mm).



(a)

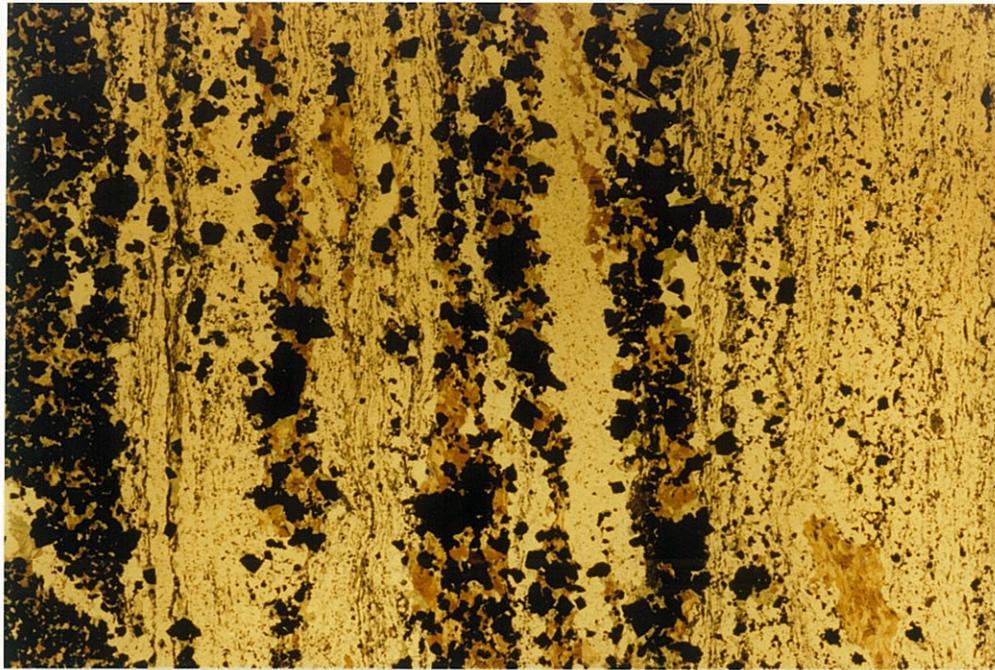


(b)

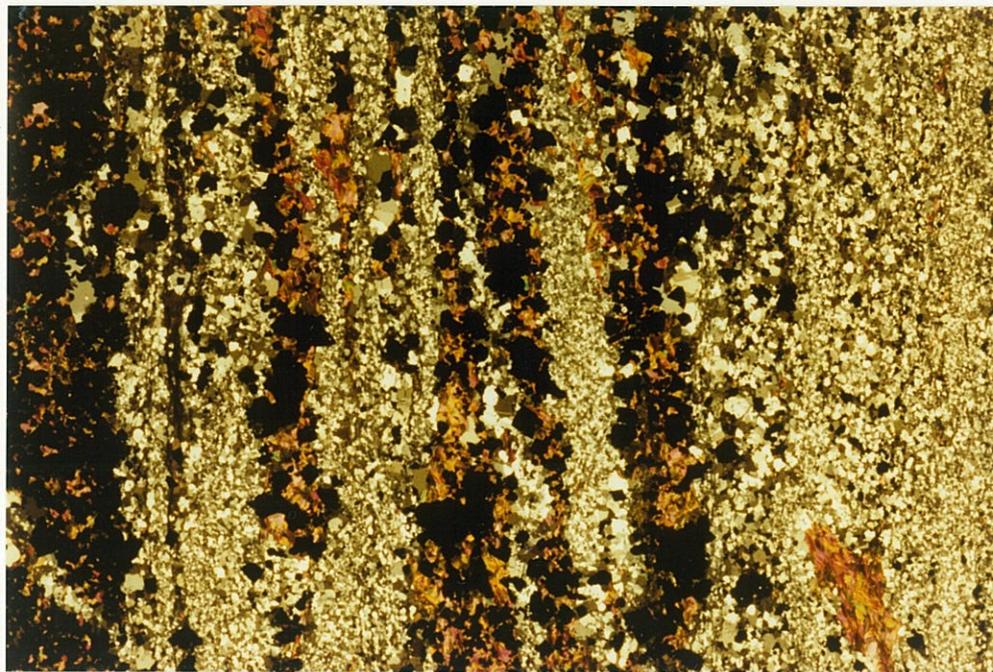
Microphoto 14: Group B<sub>4</sub>; pyrite-bearing pale schists  
(Sample 375 ØF Synk-58).

a) Major, fine grained pale chlorite and paler patches rich in fine grained albite and an overall fine dissemination of sericite and much pyrite (opaque). Thin needles of actinolite are seen. Epidote occurs as minor stubby crystals, lenses?

b) X-nicols (Photo edge = 11 mm).



(a)



(b)

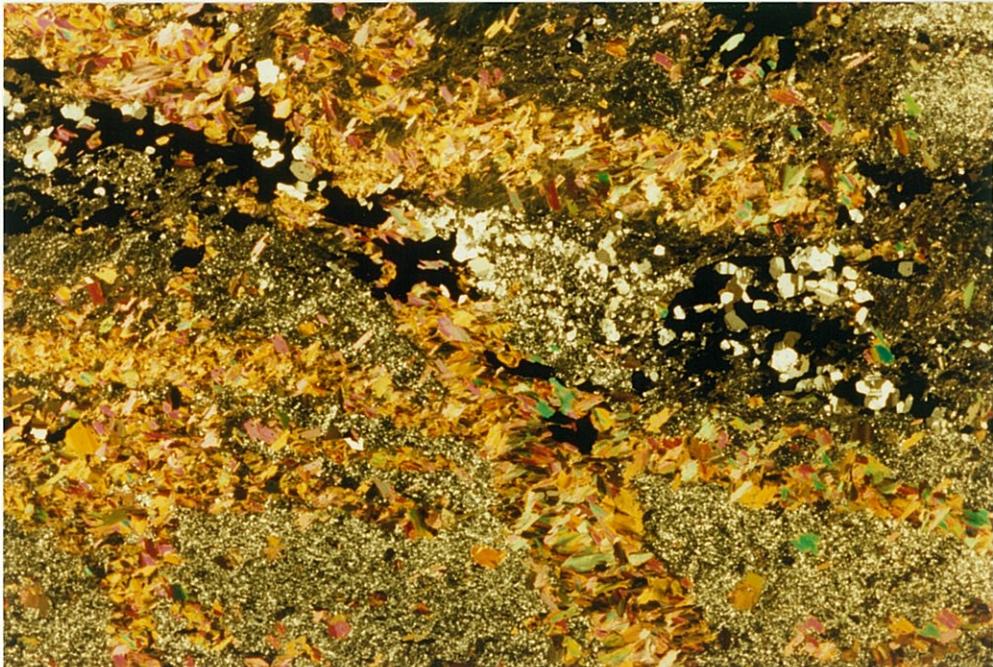
Microphoto 15: Group B<sub>5</sub>; layered, pale albitite-pyrite rock.  
(Sample J0-20/84; 385 VF.S. Strosse-13).

a) Strongly layered, fine grained granular pale albitite with thin bands - layers of pyrite (opaque) and minor sphalerite (dark brown). Minor thin slips of greenish chlorite and pale brown biotite are seen parallelling the main layering (S<sub>2</sub> schistosity).

b) X-nicols (Photo edge = 11 mm)



(a)

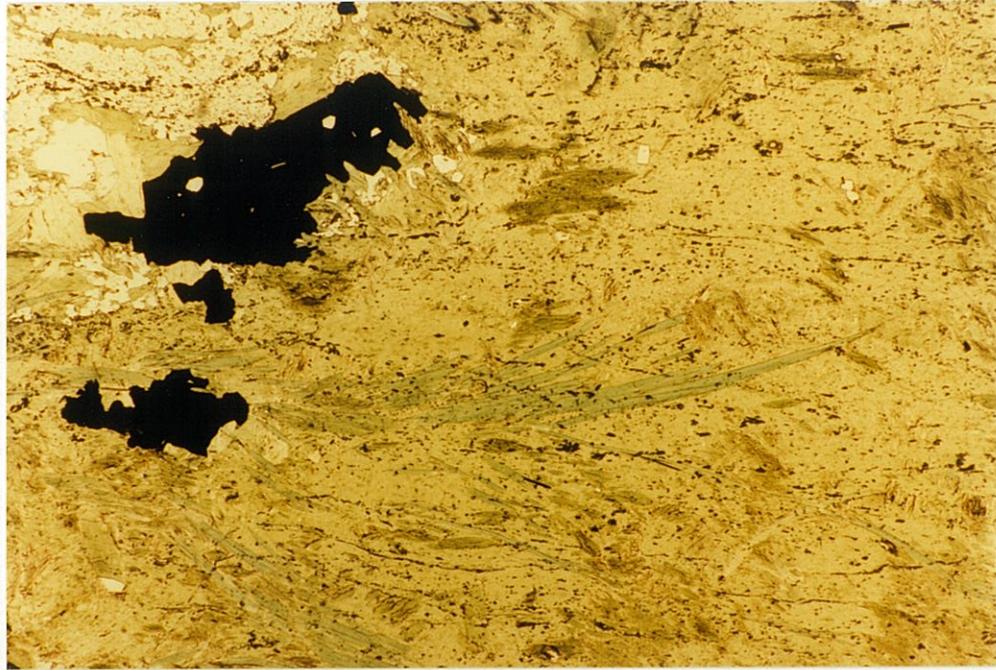


(b)

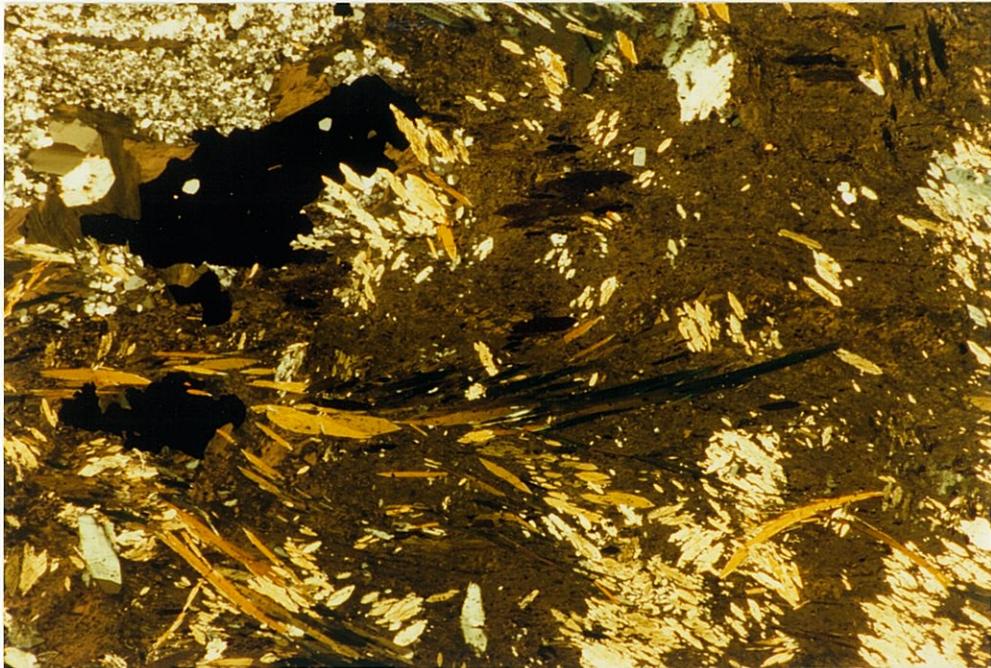
Microphoto 16: Group B<sub>6c</sub>; biotite bearing, dark Fe-chlorite schist.  
(Sample J0-21/84; 385 S.Strosse-9).

a) Dark green Fe-chlorite schist with numerous large, elongate grains and concentrations of cp+po (opaques). Contains zones-patches of fine grained albite concentrations and some larger albite porphyroblastic crystals. Thick bands and veins of brown biotite cross cuts the main S<sub>2</sub> schistosity, parallelling the S<sub>3</sub> cleavage direction. The biotite shows a post S<sub>2</sub> schistosity alteration of the dark chlorite penetrating out from the veins along the main S<sub>2</sub> schistosity.

b) X-nicols (Photo edge = 11 mm).



(a)

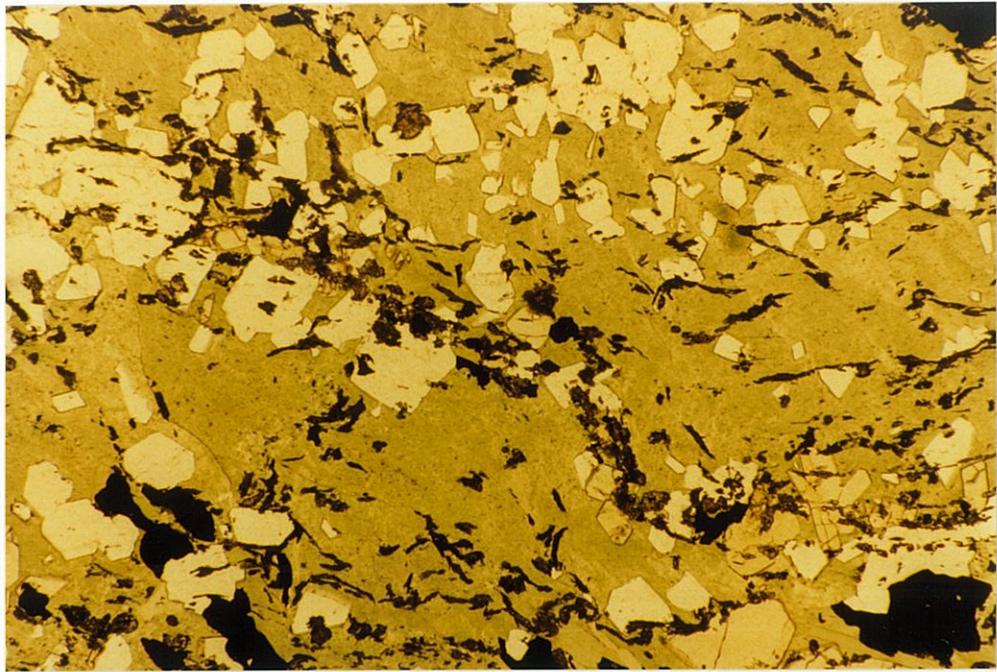


(b)

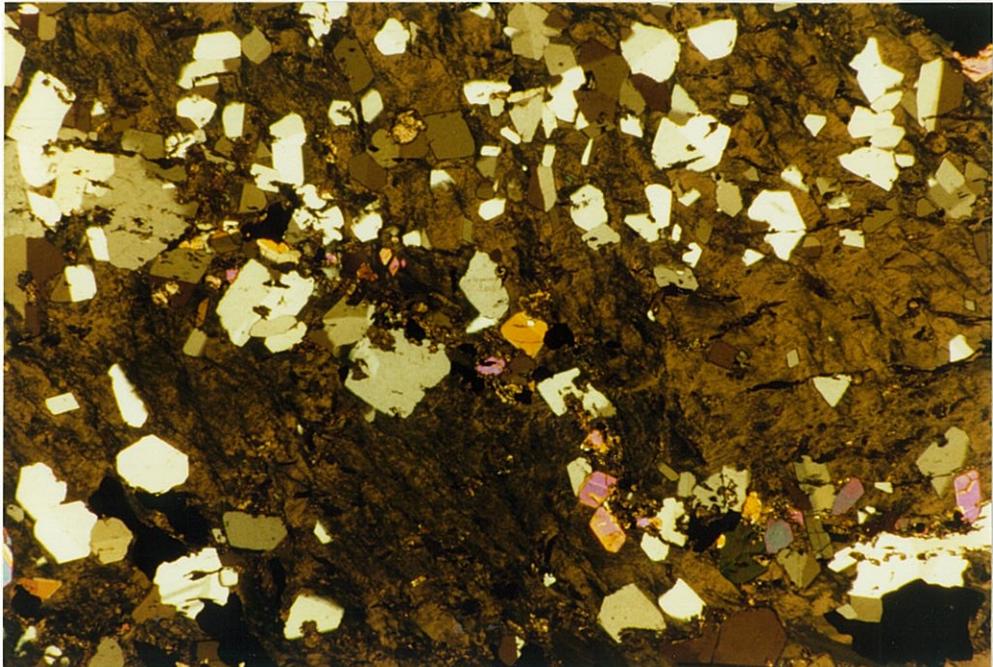
Microphoto 17: Group B<sub>6d</sub>; amphibole-bearing, dark Fe-chlorite schist.  
(Sample 375 ØF Synk-22).

a) Dark green, Fe-chlorite schist with fine grained, granular concentrated grains of albite (white), minor calcite, and large elongate grains of cp-po (opaque) that parallels the main schistosity ( $S_2$ ). Large elongate blue-green needles of Fe-amphibole are aligned roughly parallel to the  $S_3$  cleavage that cross cuts the main schistosity.

b) X-nicols (Photo edge = 5.5 mm).



(a)

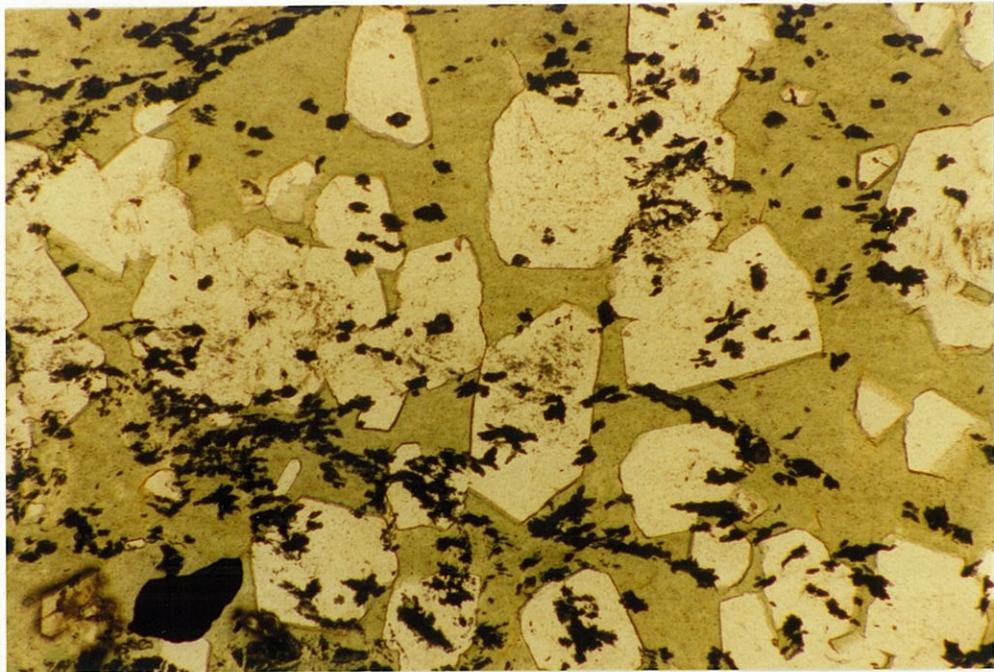


(b)

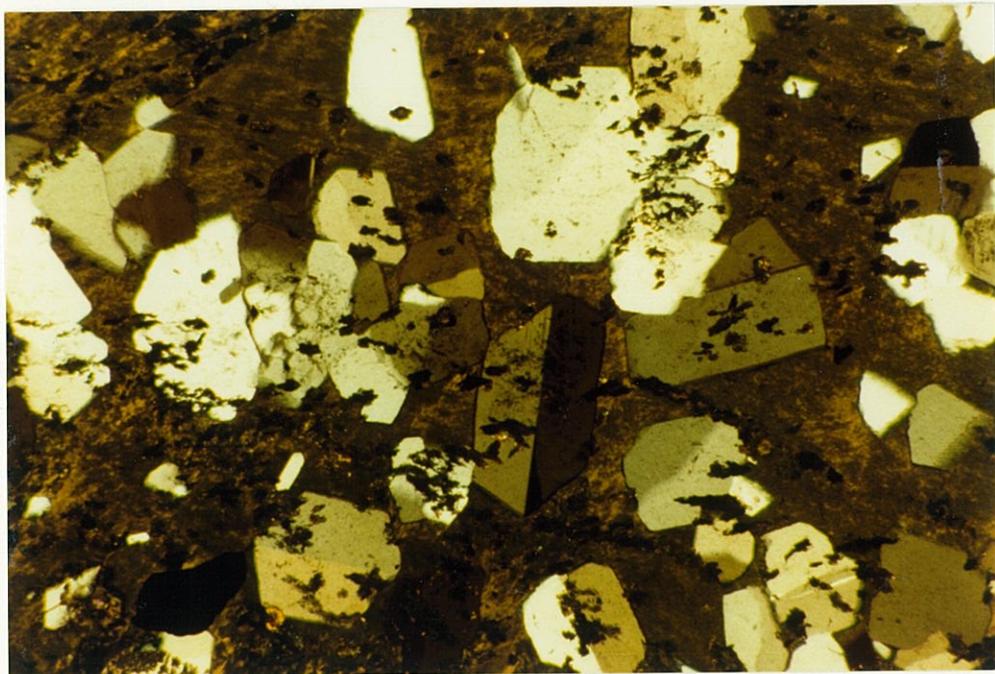
Microphoto 18: Group B<sub>6b-c</sub>; albite flecked, Fe-chlorite schist.  
(Sample 375 ØF synk-2).

a) Large, euhedral, porphyroblastic laths of albite (pale to white) overgrow trails of tiny, reddish-brown sphene crystals and associated minor opaques (cp+po). These are set in a somewhat massive matrix of dark green, Fe-chlorite. Some of the euhedral grains of sphene are aligned along a secondary  $S_3$  cleavage.

b) X-nicols (Photo edge = 3.5 mm).



(a)

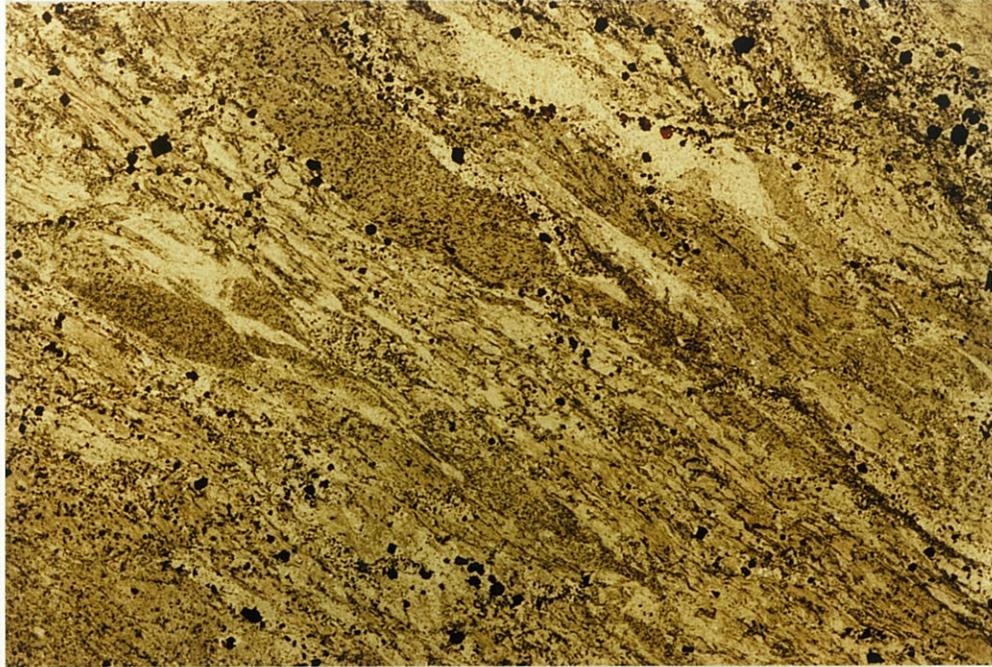


(b)

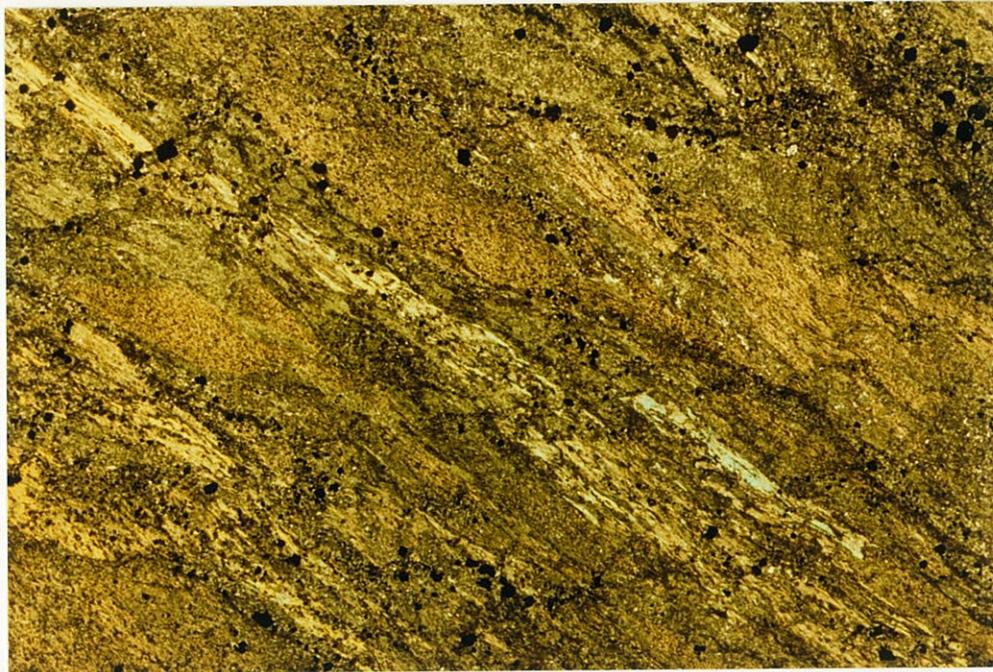
Microphoto 19: Group B<sub>6b-c</sub>; albite flecked, Fe-chlorite schist  
(Sample 375 ØF Synk-23).

From an area of large scale F<sub>3</sub> fold and porphyroblastic growth.

- a) Large euhedral, single twinned (X-nicols) porphyroblastic stubby albite laths (white to grey) set in a massive dark green Fe-chlorite matrix. These albite laths have grown over thin trails of minute reddish-brown sphen crystals and minor opaques (cp+po). The sphen is often aligned along the two major cleavage directions, S<sub>2</sub> and S<sub>3</sub>.
- b) X-nicols (Photo edge = 2 mm).



(a)

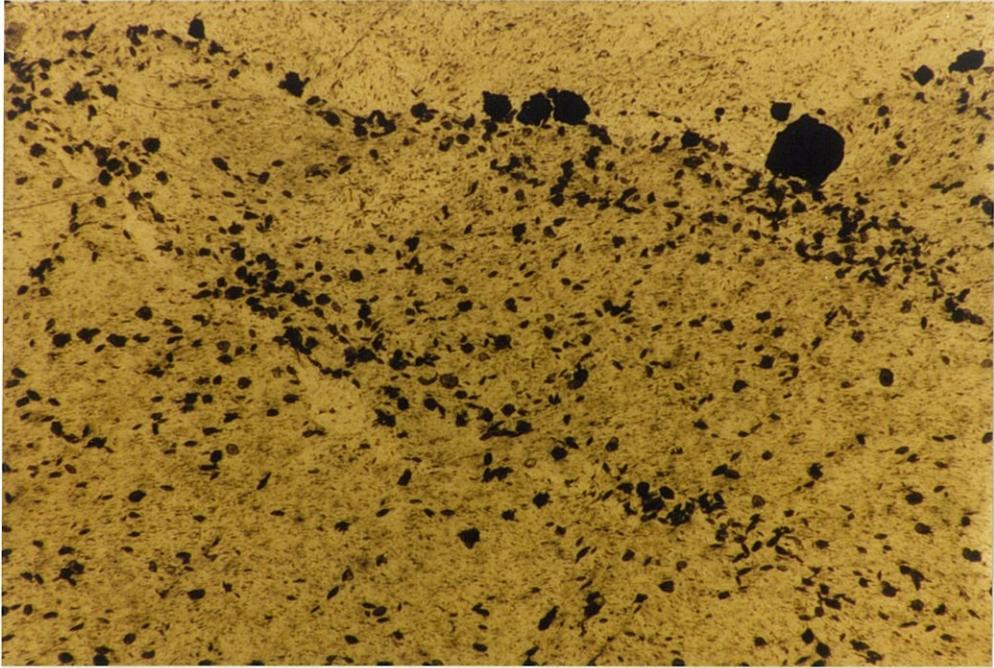


(b)

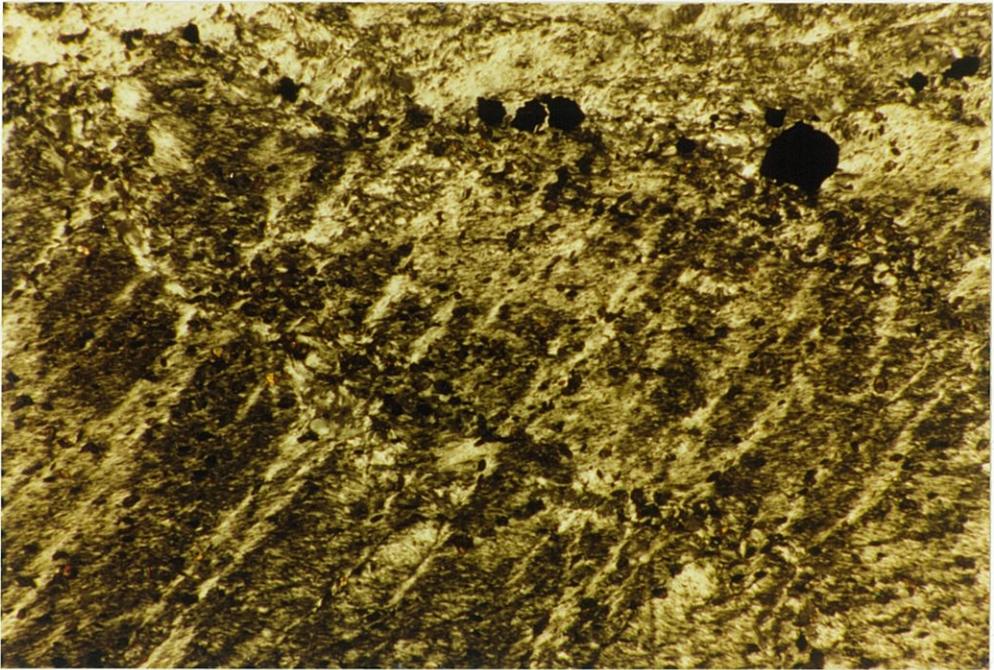
Microphoto 20: Group B<sub>6e</sub>; pyrite-bearing, chlorite schists.  
(Sample 375 ØF Synk-13.b).

a) Paler, greyish-green, fine grained Mg+Fe rich chlorite schists with fine grained disseminations and minor concentrations of sericite, albite and pyrite. Some minor thin bands and zones of albite is visible. Sphene occurs as numerous fine disseminations.

b) X-nicols (Photo edge = 11 mm).

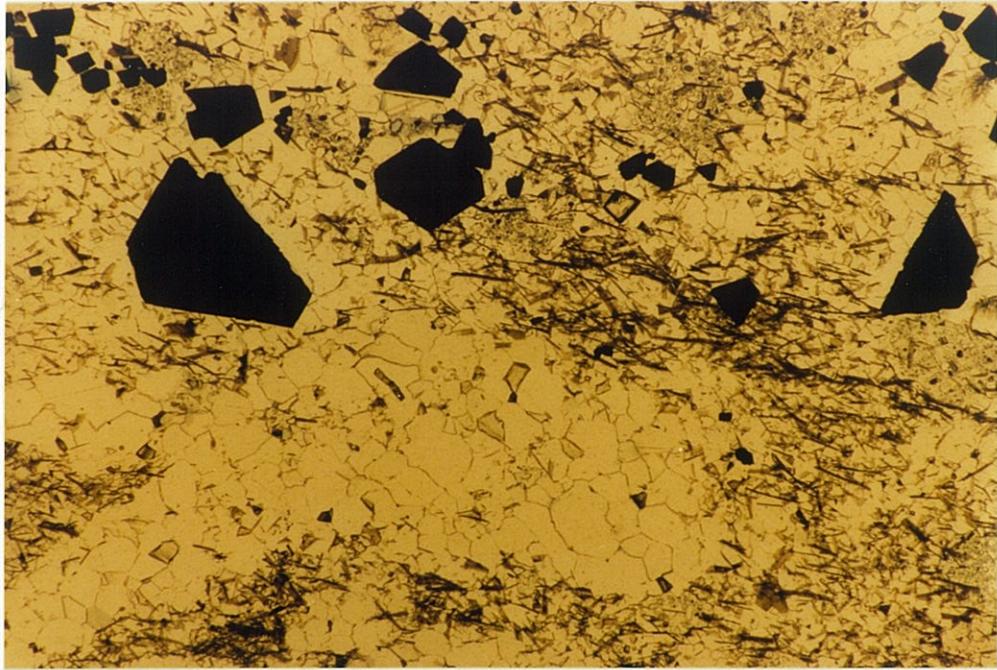


(a)

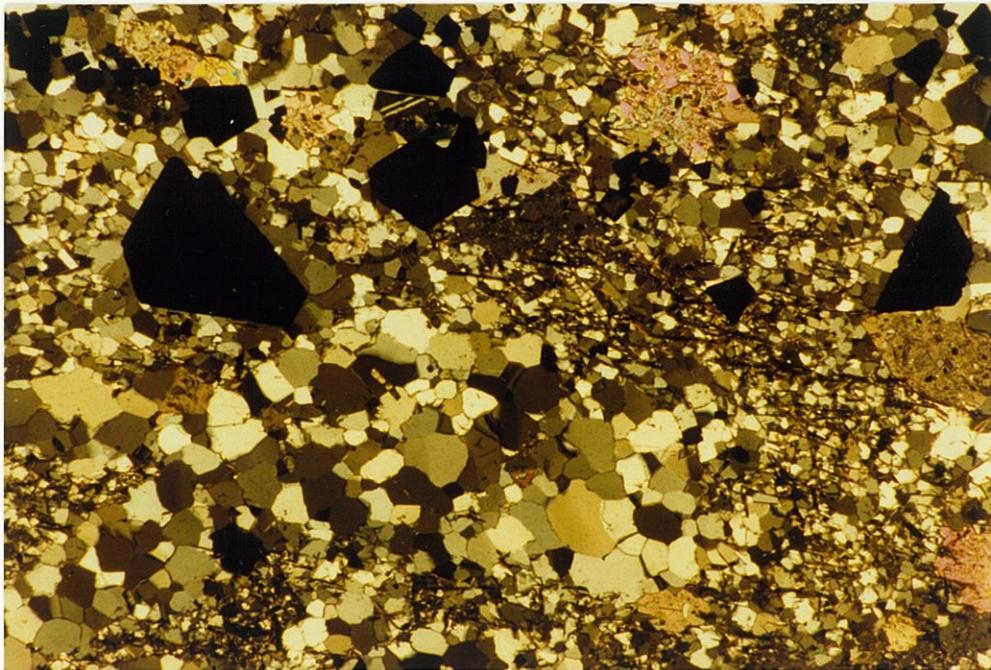


(b)

Microphoto 22: Group B<sub>6f</sub>; pale, Mg-rich chlorite schist.  
Same sample as Microphoto 21  
with higher magnification.



(a)



(b)

Microphoto 23: Dark grey, mt-bearing quartzite ('Blåkvarts').

(Sample J0-26/84; Bh. 1779-21.55 m).

a) Medium to fine grained granular, recrystallized quartz grains bearing larger idiomorphic grains of magnetite (opaque). Calcite occurs as minor large patches and stilpnomelane (amphibole?) are also seen as slightly sub-randomly orientated thin needles.

b) X-nicols (Photo edge = 4 mm).