

Appendix F – SEM-results

Hellerfjellet Drill core

Garnet

Table 1. SEM-results of the garnets analysed in Hellerfjellet drill core. 14.25-114.40 and 102.9 meters below the surface.

HF (mbs.)	14.25-14.40		102.9						
Analyse ID	3-3		2-1	2-2	2-3	2-4	5-3	8-4	9-2
O	26,75	O	26,69	26,47	26,43	26,2	26,43	26,64	31,9
Fe	25,99	Fe	22,06	21,61	21,5	21,85	21,68	21,58	16,53
Si	13,62	Si	13,66	13,62	13,56	13,62	13,55	13,64	26,53
Al	10,35	Al	10,4	10,36	10,29	10,38	10,31	10,42	4,25
Ca	4,89	Ca	4,15	4,62	4,51	4,18	4,43	4,2	12,64
Mg	1,57	Mg	2,67	2,74	2,7	2,55	2,54	2,49	3,57
Mn	1,08	Mn	3,45	2,71	2,65	3,32	3,39	3,92	4,58

Table 2 SEM-results of the garnets analysed in Hellerfjellet drill core. 91.00-91.20 meters below the surface.

HF (mbs.) 91.00-91.20																					
Anal yse ID	1-4	1-6	1-7	6-1	6-3	6-6	2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10	2-11	2-12	2-13	2-14	2-15
O	25,91	26,6 6	30,3 4	26,7 8	25,9 1	25,6 4	26,4 2	26,5 8	26,5 2	26,2 3	26,0 6	26,1 7	26,1 6	26,6 5	26,4 3	26,0 5	26,1 7	26,2 5	26,9 9	26,5 6	26,0 6
Fe	25,03	25,6 6	22,6 9	25,5 7	27,1 3	25,1 1	26,1 6	24,8	24,6 6	25,9 7	24,7 8	25,1	25,6 4	25,8 9	24,9 9	26	25,8 7	25,7 3	25,9 9	25,5 3	25,7 1
Si	13,4	13,4 4	9,17	13,6	13,3 4	13,4 1	13,3 7	13,6 3	13,4 8	13,6 1	13,5 2	13,5 8	13,5 8	13,4 9	13,4 7	13,3 8	13,4 5	13,6 7	13,5 7	13,5 1	13,5 7

Al	10,3	10,3	10,7 1	10,5	10,1 8	10,3 3	10,2 2	10,2 8	10,3 8	10,3 9	10,3 1	10,2 7	10,3 4	10,3 6	10,3	10,3 1	10,2 4	10,3 6	10,3 2	10,2 8	10,3 9
Ca	4,07	4,58		4,16	4,17	4,37	4,43	4,38	5,01	4,66	4,86	4,72	4,6	5,23	4,36	4,44	5,17	4,27	4,6	4,26	3,65
Mg	2,62	2,26	7,73	2,54	1,77	2,38	1,93	2,54	2,3	2,15	2,18	2,2	1,95	1,76	2,23	1,78	1,86	2,28	1,87	2,11	2,54
Mn							0,41	0,48	0,45	0,4	0,44	0,64	1,09	0,45	0,68	1,1	0,99	0,66	0,93	0,75	0,49

Table 3 SEM-results of the garnets analysed in Hellerfjellet drill core. 141.4 meters below the surface.

HF (mbs.)	141.5									
Analyse ID	1-9	4-12	4-13	4,2-1	4,2-2	4,2-3	4,2-4	4,2-5	4,2-6	4,2-7
O	27,62	25,98	26,61	26,93	26,65	25,88	25,87	26,44	26,41	25,51
Fe	19,66	25,43	25,61	19,81	24,02	22,67	13,38	13,31	13,43	13,84
Si	14,15	13,47	13,43	13,58	13,53	13,37	24,04	23,75	23,23	16,71
Al	10,13	10,32	10,45	10,33	10,35	10,15	6,91	7,16	7,09	13,84
Ca	10,06	4,76	4,52	10,02	6,98	7,45	6,91	7,16	7,09	13,84
Mg	1,11	2,11	2,22	1,32	1,39	1,05	1,03	1,02	1,48	0,98
Mn	1,10	0,69	0,45	1,27	1,07	1,64	1,36	1,29	1,05	1,2

Biotite

Table 4 SEM-results of the biotite analysed in Hellerfjellet drill core. 14.25-14.40 and 91.00-91.20 meters below the surface.

HF (mbs.)	14.25-14.40						91.00-91.20	
Analyse ID	1-77	3-2	6-2	2-1	2-6	2-8	3-2	6-2
O	26,32	26,95	27,18	26,32	26,1	27,26	26,95	27,18
Fe	15,68	13,95	14,04	15,13	15,58	14,96	13,95	14,04
Si	13,43	13,16	13,28	13,08	12,76	13,57	13,16	13,28
Al	8,63	8,41	8,75	8,35	8,04	8,66	8,41	8,75
K	7,54			7,4	9,23			

Mg	5,92	6,61	6,35	5,81	5,56	6,36	6,61	6,35
Ti	1,2	7,14	7,11	1,1	1,45	1,31	7,14	7,11
Mn							1,12	1,2

Table 5 SEM-results of the biotite analysed in Hellerfjellet drill core. 102.9 and 141.5 meters below the surface.

HF (mbs.)	102.9														141.5
Analyse ID	1-2	1-3	1-5	1-7	2-7	3-8	3-9	3-12	4-2	4-5	4-7	6-6	8-5	10-11	1-14
O	26,63	27,12	27,02	27,15	26,2	27,07	27,41	26,9	27,34	27,49	27,31	25,58	27,45	26,64	25,02
Si	13,45	13,27	13,08	13,39	13,04	13,08	13,23	13,3	13,12	13,34	13,3	13	13,42	13,24	12,57
Fe	10,7	10,33	10,7	9,98	9,99	10,13	10,53	10,58	10,65	10,15	10,95	10,18	10,33	10,69	13,49
Al	8,66	8,61	8,54	8,75	8,49	8,79	8,71	8,72	8,55	8,72	8,71	8,55	8,66	8,77	7,12
Mg	7,83	7,67	7,73	7,95	7,84	7,64	8,02	7,75	8	7,95	8,03	7,44	8,2	7,64	4,78
K						0,36		0,32		0,32					
Ti	6,79	7,08	6,92	7,08	6,74	6,96	6,57	6,88	6,51	6,93	6,5	6,86	7,14	7,11	7,33
Mn	0,95	1,07	1,22	1,05	1,02	1,02	0,95	1,09	0,98	1,02	0,96	1,18	0,89	0,81	1,30

Sericite

Table 6 SEM-results of the sericite analysed in Hellerfjellet drill core. 102.9 and 141.5 meters below the surface.

Mbs.	102.9	102.9	102.9	102.9	102.9	102.9	141.5
Analyse ID	1-6	2-5	9-3	9-4	9-5	10-6	1-10
O	27,85	27,76	27,29	27,04	27,97	27,9	27,98
Si	15,5	16,21	15,79	15,84	15,94	16,12	17,49
Al	16,11	16,01	16,03	15,82	16	16,05	15,09
K	7,36	7,12	7,43	7,37	7,38	7,63	8,49
Ba	1,44	1,33	2	1,42	1,87	1,44	0,74
Mg	0,92	0,89	0,9	0,9	0,9	0,92	1,37

Fe	0,94	0,86	0,92	0,87	0,92	0,97	2,01
Na	0,69	0,66	0,59	0,58	0,58	0,57	

Plagioclase

Table 7 SEM-results of the plagioclase analysed in Hellerfjellet drill core. Found in all samples.

Mbs.	14.25-14.40							91.00-91.20		102.9				142.5
Analyse ID	1-78	1-80	3-5	2-10	2-2	2-3	2-4	6-7	3-9	3-13	3-10	4-6	10-9	4-11
O	26,5	27,17	27,55	24,69	26,48	26,81	26,74	26,61	26,86	26,7	27,61	27,32	27,59	24,36
Si	21,5	21,58	20,71	18,48	21,69	21,82	21,61	20,41	21,17	19,64	20,13	20,35	20,66	19,16
Al	10,6	10,92	11,77	8,61	10,48	10,78	10,33	11,43	11,39	12,43	12,09	11,64	11,98	9,19
Na	4,83	4,75	3,64	4,36	4,96	5,01	5,04	4,18	4,58	3,66	3,88	4,2	4,21	4,04
Ca	3,57	3,73	1,85	4,27	3,3	3,39	3,13	5,14	4,17	6,66	6,04	5,38	5,54	4,84
Fe			0,72			0,25								
K			2,16	2,16										

Chlorite

Table 8 SEM-results of the chlorite analysed in Hellerfjellet drill core. From 102.9 mbs..

Mbs.	102.9			
Analyse ID	5-1	5-2	10-8	10-10
O	29,32	27,15	30,17	30,32
Al	15,75	16,05	16,21	16,6
Si	13,29	13,37	13,35	13,18
Mg	4,58	4,46	4,66	4,53
Fe	3,46	3,14	3,13	3,13
Na	1,1	1,16	1,18	1,2
Ca	0,96	0,94	0,99	1,02

Amphibole - Hornblende

Table 9 SEM-results of the Amphibole - hornblende analysed in Hellerfjellet drill core. From 14.25-14.40 and 91.00-91.20 mbs..

HF (mbs.)	14.25-14.40	91.00-91.20			
Analyse ID	1-79	3-1	3-3	3-5	3-7
O	27,42	27,95	27,96	28,12	27,26
Si	15,07	15,29	15,19	15,46	15,11
Fe	15,01	12,98	13,1	12,77	12,96
Ca	8,56	8,83	8,68	8,61	8,68
Al	7,74	8,22	8,15	8,12	7,99
Mg	4,07	4,69	4,66	4,88	4,76
Na	1,3	1,09	1,13	1,23	1,11
K	0,53	0,68	0,62	0,66	0,62
Ti	0,42	0,44	0,59	0,58	0,48

Calcite

Table 10 SEM-results of the calcite analysed in Hellerfjellet drill core. From 14.24-14.40, 91.00-91.20 and 141.5 mbs..

Mbs.	14.25-14.40	91.00-91.20	141.5
Analyse ID	4-14	6-5	3-1
Ca	63,24	47,68	46,76
O	15,33	28,51	32,68
Fe	2,4	1,46	0,84
Mn	0,49		
Mg		0,39	

Calcite with inclusions

Table 11 SEM-results of calcite with inclusions analysed in Hellerfjellet drill core. From 91.00-91.20, 102.9 and 141.5 mbs..

Mbs.	91.00-91.20	102.9		141.50
Analyse ID	6-4	7-1	1-11	7-2
Ca	37,86	34,55	29,51	29,71
O	37,78	28,41	27,01	26,83
Si		0,7	3,1	0,83
Al			2,01	
Fe	1,44	1,03	0,78	8,67
Na			0,75	
Mn		0,43	0,45	0,45
Mg	0,97	0,7		0,77
S		0,63		3,46

Sulphides

Pyrrhotite

Table 12 SEM-results of the pyrite analysed in Hellerfjellet drill core. From all samples.

Mbs	14.25-14.40		91.00-91.20				102.90										141.5
	3-2	3-6	1-1	1-3	3-4	3-6	1-1	2-6	4-1	4-3	4-4	6-4	6-5	8-6	8-3	10-7	1-12
Fe	55,06	53,91	54,34	54,25	53,72	53,77	55,59	54,63	55,88	53,98	54,83	48,27	57,25	53,85	54,89	56,18	53,19
S	29,71	29,63	29,51	29,25	29,35	29,29	29,92	29,95	30,18	29,59	29,81	29,9	27,79	29,21	29,75	30,4	22,74

Chalcopyrite

Table 13 SEM-results of the chalcopyrite analysed in Hellerfjellet drill core. From 91.00-91.20 mbs..

Mbs.	91.00-91.20
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Analyse ID	1-2
Cu	30,75
Fe	27,6
S	26,92

Ilmenite

Table 14 SEM-results of the ilmenit analysed in Hellerfjellet drill core from 14.25-14.40 mbs..

HF	14.25-14.40						
	1-70	1-71	1-75	1-76	2-4	2-5	3-1
Fe	38,36	37,76	37,49	38,47	37,94	38,26	37,31
Ti	34,16	33,76	33,49	34,24	34,32	33,95	33,12
O	23,29	22,8	22,38	23,17	23,53	23,26	23,01

Massive ore

Pyrrhotite

Table 15 SEM-results of the Pyrrhotite analysed in the field samples. From sample HES-04NGU.

Sample	HES-04NGU														
Analyse ID	b1 p1	b2 p5	b2 p7	b3 p3	b8 p5	b2 p9	b2 p10	b3 p2	b4 p1	b4 p4	b6 p3	b6 p2	b7 p5	b9 p3	b10 p4
Fe	54,32	44,74	54,13	54,29	39,44	38,8	55,17	39,85	40,94	39,82	58,32	46,66	39,08	44,54	51,22
S	29,61	19,60	29,29	29,92	39,41	37,97	30,05	39,48	40,64	29,42	25,36	32,44	38,8	33,09	31,51

Table 16 SEM-results of the Pyrrhotite analysed in the field samples. From sample HF-10NGU

Sample	HF-10NGU																			
	b1 p3	b1 p4	b1 p7	b1 p8	b1 p9	b1 p10	b1 p13	b1 p14	b3 p25	b4 p27	b4 p28	b4 p30	b5 p34	b5 p35	b5 36	b5 p37	b6 p43	b7 p46	b7 p48	b7 p49
Fe	37,78	35,94	34,48	43,06	55,01	51,58	55,00	44,40	53,87	53,80	53,41	44,63	54,57	47,43	45,34	48,83	55,6	55,58	45,11	54,86
S	20,94	17,46	17,69	16,85	22,43	18,64	19,66	22,09	28,27	28,08	28,15	31,57	29,85	35,3	33,46	31,95	30,61	30,4	35,66	30,42

Table 17 SEM-results of the Pyrrhotite analysed in the field samples. From sample HF-x18.

Sample	HF-x18										
	b1 p1	b3 p9	b4 p1	b5 p1	b5 p4	b6 p1	b6 p2	b7 p1	b7 p2	b7 p5	b8 p3
Fe	53,77	38,93	53,88	54,41	53,9	54,27	54,47	53,93	53,81	54,37	54,6
S	35,44	21,64	29,55	29,78	29,67	29,66	29,72	29,56	29,49	22,79	29,99

Pyrite**Table 18 SEM-results of the Pyrite analysed in the field samples. From sample HES-04NGU.**

Sample	HES-04NGU			
	b2 p1	b8 p5	b2 p9	b4 p7
Fe	40,25	39,44	38,8	38,32
S	40,18	39,41	37,97	37,01

Table 19 SEM-results of the Pyrite analysed in the field samples. From sample HAM-B2.

Sample	HAM-B2						HS-5			HF-x18
	b1 p18	b5 p1	b3 p27	b4 p29	b5 p3	b5 p1	b1 p5	b3 p4	b5 p13	b3 p3

Fe	40,98	50,11	38,47	38,49	39,86	40,88	39,65	40,71	40,79	39,12
S	40,37	49,89	38,03	38,82	39,71	40,7	39,24	40,49	40,34	37,76

Chalcopyrite

Table 20 SEM-results of the Chalcopyrite analysed in the field samples. From sample HAM-4NGU, HES-04NGU and HF-10NGU.

Sample	HAM-4NGU	HES-04NGU							HF-10NGU
	b5 p8	b1 p5	b2 p8	b2 p3	b4 p6	b4 p2	b7 p8	b10 p6	b1 p12
Cu	31,57	30,92	30,73	31,23	30,89	31,17	31,69	30,95	29,78
Fe	28,1	26,89	27,15	27,36	26,79	27,4	27,54	27,09	28,03
S	31,2	26,34	26,47	27,11	26,42	26,75	26,97	26,58	18,56

Table 21 SEM-results of the Chalcopyrite analysed in the field samples. From sample HAM-B2 and HF-x18.

Sample	HAM-B2						HF-x18
	b1 p19	b2 p21	b2 p22	b3 p26	b4 p28	b5 p2	b8 p1
Cu	32,97	31,84	31,61	31,11	30,64	31,74	30,92
Fe	28,73	27,09	27,54	27,15	26,55	27,86	28,08
S	26,25	26,94	26,95	26,65	26,52	26,96	27,49

Sphalerite

Table 22 SEM-results of the Sphalerite analysed in the field samples. From sample HAM-4NGU and HES-04NGU.

Sample	HAM-4NGU			HES-04NGU																
Analysis ID	b2 p7	b4 p5	b4 p6	b1 p2	b1 p4	b2 p2	b2 p4	b2 p6	b3 p1	b4 p3	b4 p5	b7 p1	b7 p3	b7 p6	b7 p7	b8 p1	b8 p4	b9 p2	b10 p5	b10 p8

Zn	52,8 6	52,9 6	52,1 6	51,6 9	51,8	53,2 9	52,7 8	54,1 3	53,7 1	53,7 1	53,6 1	52,0 4	53,2 1	52,3 9	53,2 4	52,7 3	52,7 7	52,4 8	53,1 9	51,5
S	25,0 6	24,9 3	24,7 7	24,7 4	25,1 3	25,3 6	25	25,0 7	25,6 5	25,1 7	25,1 5	25,1 7	24,9 6	24,9 3	25,1 3	25,2 5	25,3 9	24,6 9	25,1 9	24,7 9
Fe	5,84	5,84	5,85	6,01	6,07	5,58	5,51	4,66	6,2	5,42	5,53	6,13	5,76	5,82	5,29	6,28	6,27	6,63	5,76	5,73

Table 23 SEM-results of the Sphalerite analysed in the field samples. From sample HF-10NGU.

Sample	HF-10NGU								
Analyse ID	b1 p2	b1 p5	b1 p6	b3 p24	b4 p29	b5 p33	b6 p41	b7 p45	b7 p47
Zn	46,80	45,70	48,36	51,15	50,52	52,01	51,28	52,16	52,21
S	19,32	17,80	19,18	23,50	23,28	25,06	25,2	25,45	25,3
Fe	7,59	7,54	7,41	6,74	6,80	6,44	6,53	6,84	6,83

Table 24 SEM-results of the Sphalerite analysed in the field samples. From sample HAM-B2 and HF-x18.

Sample	HAM-B2		HF-x18	
Analyse ID	b3 p25	b5 p6	b7 p3	b8 p2
Zn	57,03	51,88	47,59	45,99
S	24,69	25,16	25,1	25,09
Fe	7,06	5,89	6,59	6,67
Mn			2,59	3,13

Galena

Table 25 SEM-results of the Galena analysed in the field samples. From sample HAM-04NGU, HF-10NGU and HAM-B2.

Sample	HAM-04NGU					HF-10NGU								HAM-B2
Analyse ID	b2 p8	b2 p11	b3 p2	b3 p1	b4 p4	b1 p1	b1 p11	b1 p15	b2 p21	b3 p23	b4 p26	b6 p40	b6 p42	bB2 p7

Pb	87,49	87,67	89,81	89,01	89,68	80,36	78,76	77,24	91,27	91,02	92,19	88,66	90,61	86,12
s	9,87	10,18	10,06	10,01	10,24	9,02	9,54	8,78	9,59	9,44	9,53	10,04	10,07	10,02

Rutile

Table 26 SEM-results of the Rutile analysed in the field samples. From sample HF-x18.

Rutil	HF-x18		
	b2 p2	b2 p4	b5 p3
Ti	60,06	62,29	63,66
O	28,25	28,43	29,26
Nb	1,22	0,62	

Magnetite

Table 27 SEM-results of the Magnetite analysed in the field samples. From sample HF-x18.

Magnetite	HF-x18
	b3 p5
Fe	53,36
O	28,88
Al	2,04
Si	2,02
S	1,04

Barite

Table 28 SEM-results of the Barite analysed in the field samples. From sample HES-04NGU.

Sample	HES-04NGU
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	b5 p7	b6 p1	b7 p2	b7 p4	b8 p3	b9 p1
Ba	54,46	54,59	54,56	54,72	54,49	54,32
O	13,42	13,61	13,27	13,41	13,74	13,2
S	11,65	11,5	11,7	11,57	11,58	11,54

Celcian

Table 29 SEM-results of the Celcian analysed in the field samples. From sample HES-04NGU.

Sample	HES-04NGU		
Analysis ID	b1 p3	b1 p6	b5 p32
Ba	26,21	31,07	34,48
O	18,48	17,92	18,29
Si	13,26	11,78	11,1
Al	11,34	12,1	12,47
K	2,44	0,97	
Zn	0,97		
Fe	0,59		

Biotite

Table 30 SEM-results of the Biotite analysed in the field samples. From sample HF-x18 and HS-5.

Sample	HF-x18			HS-5		
Analyse ID	b1 p3	b3 p12	b5 p7	b6 p15	b6 p16	b6 p 17
O	26,27	26,49	26,22	26,43	28,49	26,23
Si	13,51	13,63	13,48	13,93	15,22	13,64
Mg	9,53	0,67	9,59	10,58	11,72	10,63
Al	8,18	8,15	8,26	8,46	9,46	8,52
K	7,75	7,75	7,78	7,23	7,09	6,93
Fe	4,3	4,5	4,38	3,07	3,16	3,25

Ti	1,13	1,24	1,19		0,55	0,55
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Sericite

Table 31 SEM-results of the Sericite analysed in the field samples. From sample HAM-B2 and HF-x18.

Sample	HAM-B2		HF-x18		
Analyse ID	b5 p4	b5 p5	b3 p7	b3 p10	b5 p8
O	26,64	26,66	24,88	28,08	26,63
Si	16,03	15,93	16,42	16,83	16,14
Mg	1,65	1,58	1,2	1,82	1,21
Al	14,26	14,5	14,58	13,69	14,46
K	7,74	7,82	8	8,29	8,11
Fe	1,38	1,51	0,54	0,83	0,6
Ba	2,57	2,34	0,81	0,85	0,86
Na			0,38		

Plagioclase

Table 32 SEM-results of the Plagioclase analysed in the field samples. From sample HF-x18 and HS-5.

Sample	HF-x18		HS-5			
Analyse ID	b6 p4	b6 p5	b1 p7	b3 p3	b4 p8	b5 p14
O	27,61	28,35	25,96	26,24	26,13	26,05
Si	15,6	16,35	21,91	21,67	21,88	22,11
Al	15	15,64	10,18	10,33	10,19	10,56
Ca	12	12,43	2,76	2,88	2,69	2,92
Na	1,17	1,1	5,11	5,11	5,21	5,06

K-feldspar

Table 33 SEM-results of the potassium feldspar analysed in the field samples. From sample HF-x18.

Sample	HF-x18			
Analyse ID	b3 p8	b3 p11	b4 p2	b5 p9
O	24,66	25,62	24,81	24,89
Si	21,05	21,84	21,13	21,42
K	10,98	11,37	11,06	11,17
Al	8,42	8,59	8,42	8,54
Ba	1,25	1,39	1,21	1,39

Titanite

Table 34 SEM-results of the titanite analysed in the field samples. From sample HF-x18.

Sample	HF-x18			
analysis ID	b2 p1	b2 p3	b2 p5	b5 p2
O	26,23	26,69	26,2	25,74
Ti	22,53	23,59	22,97	22,59
Ca	19,28	20,19	19,33	19,11
Si	10,25	10,55	10,25	10,27
Al	1,16	1,07	1,03	1,15

Kyanite

Table 35 SEM-results of the Kyanite analysed in the field samples. From sample HS-5.

Sample	HS-5					
Analyse ID	b3 p1	b3 p2	b4 p6	b5 p9	b5 p10	b5 p12
Al	28,08	27,92	27,56	28,05	28,26	27,72
O	26,75	26,93	26,49	27,28	27,02	26,57
Si	12,35	12,29	12,35	12,39	12,48	12,41

Hyalophane

Table 36 SEM-results of the Hyalophane analysed in the field samples. From sample HAM-B2.

Sample	HAM-B2	
Analyse ID	b2 p23	b4 p30
O	24,1	24,47
Si	20,38	20,3
K	9,32	9,65
Al	8,98	8,95
Ba	5,48	5,42

Apatite

Table 37 SEM-results of the Apatite analysed in the field samples. From sample HF-x18.

Sample	HF-x18		
Analyse ID	b1p5	b3 p1	b5 p5
Ca	38,43	37,96	37,92
O	23,46	23,8	23,2
P	13,92	13,9	13,72
F	1,94	1,93	2,1

Freibergite

Table 38 SEM-results of the Freibergite analysed in the field samples. From sample HF-10NGU.

HF-10NGU	b2 p20
Cu	24,61
Sb	21,54

S	17,2
Ag	9,76
Fe	4,86