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APPENDICES

APPENDIX A

Example of the Resampling Statistics procedure of 20 Analyses of Cu from experiment 10m4:

(Comments are in Italics)

```

construct a bootstrap confidence interval for the mean
maxsize default 15000
clear list
numbers (42.64 27.33 44.51 73.80 70.85 76.41 64.76 61.50 58.24 66.73 35.62 12.69 21.33 41.17
36.11 23.62 10.71 17.15 27.44 20.13) 10m4
find the mean of the 10m4 data and call it Mean10m4
mean 10m4 Mean10m4
repeat 15000 times
repeat 15000
take a sample of 20 with replacement from the 10m4 data and call it d
sample 20 10m4 d
find the mean of the resample and call it mean$
mean d mean$
keep score of the trial result and put it in dd
score mean$ dd
end
calculate the 15.85 and 84.15 % and put them into error
percentile dd (5 95) error
print the actual mean and the error
print Mean10m4 error
display as a histogram the variation of the mean in the resampled populations
histogram dd
MEAN10M4 = 41.637

ERROR = 33.893 49.521

```


Vector no. 1: DD

Bin Center	Freq	Pct	Cum Pct
25	15	0.1	0.1
30	372	2.5	2.6
35	2524	16.8	19.4
40	5747	38.3	57.7
45	4688	31.3	89.0
50	1476	9.8	98.8
55	168	1.1	99.9
60	10	0.1	100.0

Note: Each bin covers all values within 2.5 of its center.

Successful execution. (21.1 seconds)

APPENDIX B

Starting compositions for all the experiments.

1200°C					
Exp no.	Cu	Ni	Fe	S	
12l1	74.01	20.07	1.03	4.89	
12l2	49.40	44.60	1.07	4.93	
12l3	30.06	63.84	1.13	4.97	
12l4	9.94	83.88	1.20	4.99	
12l5	59.69	29.38	1.07	9.86	
12l6	30.04	58.93	1.15	9.88	
12m1	72.72	19.49	2.90	4.90	
12m2	47.91	44.22	2.92	4.95	
12m3	29.40	62.82	2.99	4.80	
12m4	9.81	82.35	3.00	4.84	
12m5	58.43	28.87	2.76	9.94	
12m6	29.21	58.39	2.72	9.68	
12n1	71.09	19.44	4.80	4.67	
12n2	47.59	42.83	4.69	4.89	
12n3	28.49	61.82	4.84	4.84	
12n4	9.62	80.70	4.77	4.91	
12n5	57.26	28.41	4.71	9.62	
12o1	67.69	18.45	9.29	4.58	
12o2	45.28	41.05	9.10	4.57	
12o3	27.30	59.05	9.10	4.55	
12o4	9.05	77.18	9.12	4.64	
12o5	54.43	27.25	9.16	9.16	
12o6	27.33	54.55	8.94	9.18	

1100°C					
Exp no.	Cu	Ni	Fe	S	
11a1	61.14	34.45	1.10	3.31	
11a2	79.24	9.90	1.00	9.86	
11a3	69.12	15.04	0.90	14.94	
11a4	58.07	25.52	1.07	15.33	
11a5	73.76	20.54	1.01	4.69	
11b1	64.94	28.70	1.18	5.18	
11b2	49.47	44.06	1.46	5.01	
11b3	29.29	59.20	1.17	10.34	
11b4	9.92	78.75	1.27	10.06	
11b5	59.70	29.26	1.17	9.87	
11c1	86.79	5.20	2.84	5.17	
11c2	76.55	10.32	2.94	10.19	
11c3	66.12	16.42	2.91	14.55	
11c4	58.67	24.31	3.04	13.98	
11c5	72.41	19.54	3.15	4.89	
11d1	62.80	29.02	3.17	5.01	
11d2	47.72	44.57	2.82	4.89	
11d3	28.95	58.16	3.02	9.87	
11d4	10.32	77.60	2.76	9.33	
11d5	58.47	28.45	2.82	10.27	
11e1	48.35	41.93	4.98	4.75	
11e2	56.98	28.54	4.86	9.62	
11e3	66.62	14.77	4.66	13.95	
11e4	57.67	23.81	4.82	13.70	
11e5	71.04	19.50	4.66	4.80	
11f1	61.45	28.88	4.72	4.96	
11f2	28.76	56.94	4.80	9.50	
11f3	8.54	77.08	4.87	9.51	
11g1	81.90	4.31	9.18	4.61	
11g2	71.96	9.27	9.34	9.44	
11g3	64.08	13.60	9.07	13.24	
11g4	59.20	26.87	9.17	4.75	
11g5	67.59	18.77	9.17	4.47	
11h1	54.36	23.02	8.96	13.66	
11h2	45.02	41.24	9.20	4.55	
11h3	27.61	54.27	9.11	9.01	
11h4	10.60	71.32	9.09	8.99	
11h5	54.35	27.31	9.10	9.24	

1000°C					
No.	Cu	Ni	Fe	S	
10a	28.74	56.72	5.21	9.32	
10b	56.80	28.04	5.77	9.39	
10e1	9.14	76.04	5.04	9.78	
10e2	75.93	9.37	5.44	9.27	
10e3	18.85	66.70	5.57	8.88	
10f1	34.14	54.12	3.08	8.65	
10f4	54.90	27.50	3.80	13.80	
10g1	47.96	29.45	3.01	19.59	
10g2	9.46	77.08	3.32	10.14	
10g3	19.66	67.42	3.30	9.63	
10g4	72.27	8.74	10.06	8.94	
10h3	55.22	26.17	10.19	8.42	
10h4	17.84	63.79	9.57	8.79	
10i1	9.47	71.65	10.10	8.78	
10i4	29.63	59.33	1.03	10.01	
10i5	10.18	78.74	1.29	9.78	
10j1	68.61	16	0.87	14.52	
10j3	62.78	31.05	0.88	5.29	
10j4	77.36	9.57	3.14	9.93	
10k1	67.26	13.96	4.53	14.26	
10k2	62.90	29.30	3.23	4.57	
10k4	62.65	12.92	12.26	12.17	
10k5	47.88	29.16	10.81	12.14	
10l3	19.65	69.17	1.06	10.11	
10l4	9.88	79.27	1.03	9.81	
10l5	69.05	5.25	0.94	24.76	
10m3	39.40	44.68	1.16	14.76	
10m4	59.04	20.25	1.12	19.59	
10m5	29.13	58.05	2.99	9.83	
10n2	63.39	28.95	2.90	4.76	
10n3	67.89	14.76	3.04	14.30	
10n4	67.53	5.12	2.94	24.41	
10n5	9.30	68.12	2.68	19.91	
10o2	39.01	43.70	2.86	14.42	
10o3	58.22	19.19	2.86	19.73	
10o4	57.58	28.14	4.71	9.56	
10p2	51.39	29.32	4.88	14.41	
10p4	9.37	66.62	4.82	19.20	
10q2	63.24	4.91	9.19	22.66	
10q4	9.43	63.50	8.93	18.13	
10q5	36.35	41.18	8.94	13.54	

9m3	58.39	4.31	9.16	28.14	
9n3	64.22	4.96	1.13	29.68	
9n5	9.71	77.71	2.80	9.78	
9o2	18.68	67.02	4.79	9.51	
9o3	47.99	28.42	4.64	18.95	
9o4	36.50	45.12	9.36	9.02	
9o5	18.22	63.52	8.99	9.26	
9o6	9.34	72.05	9.13	9.47	

900°C					
Exp. No.	Cu	Ni	Fe	S	
9a3	45.23	35.56	10.00	9.21	
9b1	39.81	49.44	0.98	9.77	
9b2	21.15	67.30	0.95	10.59	
9b4	58.87	17.95	1.15	22.03	
9c1	49.25	44.89	0.93	4.93	
9c2	67.77	16.26	1.06	14.91	
9c3	67.70	14.78	2.94	14.58	
9c4	47.32	44.69	2.96	5.03	
9c5	48.44	41.44	5.26	4.86	
9d1	41.70	38.36	5.12	14.82	
9d2	66.16	14.67	5.07	14.11	
9d3	45.13	40.52	10.04	4.31	
9d4	40.14	36.64	10.41	12.81	
9d5	62.40	13.90	10.48	13.22	
9e1	68.11	21.07	1.24	9.57	
9e2	35.47	47.99	1.24	15.30	
9e3	53.78	19.67	1.17	25.38	
9e4	5.02	58.60	1.12	35.27	
9f1	67.62	19.76	3.10	9.51	
9f2	33.32	48.44	3.26	14.98	
9f3	5.87	57.15	3.26	33.71	
9f4	67.02	18.77	4.96	9.25	
9g1	63.44	17.96	9.15	9.45	
9g2	50.89	18.34	9.67	21.11	
9g3	4.91	52.65	11.35	31.09	
9g4	9.77	43.88	10.29	36.06	
9h1	44.51	39.23	1.04	15.23	
9h2	9.97	49.97	1.00	39.06	
9h3	49.37	25.25	0.99	24.39	
9h4	45.41	19.26	1.18	34.15	
9h5	23.73	39.80	1.08	35.38	
9i1	0.00	54.54	1.08	44.39	
9i2	43.56	39.55	2.88	14.01	
9i3	54.07	19.09	2.95	23.88	
9i4	10.35	48.67	2.79	38.18	
9i5	48.25	24.18	3.00	24.58	
9j1	44.63	19.20	2.87	33.30	
9j3	0.00	52.61	2.99	44.40	
9j5	34.56	46.16	4.82	14.46	
9k1	52.63	18.33	4.79	24.24	
9k2	4.71	57.60	4.77	32.92	
9k4	48.17	24.23	4.85	22.75	
9k5	42.56	19.50	4.55	33.40	
9l1	23.49	37.93	4.90	33.68	
9l2	0.00	52.33	4.84	42.83	
9l3	32.13	44.75	9.51	13.61	
9l4	44.94	23.07	9.09	22.90	
9l5	40.98	18.74	9.04	31.24	
9m1	22.23	35.93	9.49	32.35	
9m2	0.00	49.15	8.94	41.91	

800°C				
Exp. No.	Cu	Ni	Fe	S
8a1	9.45	58.44	3.60	28.50
8a2	3.89	82.30	3.49	10.32
8a3	14.45	71.79	3.78	9.98
8a4	23.75	63.11	3.07	10.07
8a5	18.34	49.85	3.04	28.77
8b1	75.90	9.97	4.66	9.48
8b2	15.41	69.48	5.05	10.07
8b3	51.33	20.21	4.87	23.59
8b4	47.92	25.11	5.16	21.80
8b5	60.14	10.14	5.47	24.24
8c2	9.94	56.48	5.33	28.25
8c3	66.02	19.47	5.13	9.38
8c4	22.23	58.81	9.76	9.20
8c5	5.92	74.94	9.86	9.27
8d1	49.24	18.02	10.08	22.67
8d2	57.59	9.75	10.10	22.56
8d3	9.12	53.66	10.32	26.90
8d4	18.43	44.82	9.93	26.82
8e1	79.32	9.83	1.05	9.80
8e2	40.14	48.38	1.10	10.38
8e3	25.42	63.27	1.29	10.01
8e4	14.55	74.00	1.03	10.41
8f1	77.58	9.80	2.98	9.64
8f2	48.15	23.74	3.02	25.10
8f3	61.78	10.23	2.94	25.05
8f4	66.93	19.64	3.78	9.64
8f5	38.76	53.04	3.61	4.59
8g1	27.60	54.25	3.28	14.86
8g2	66.67	15.09	3.14	15.09
8g3	38.28	51.65	5.22	4.85
8g4	23.99	61.41	5.01	9.59
8g5	6.27	79.54	4.83	9.37
8h1	28.39	51.49	5.22	14.91
8h3	17.67	48.31	5.10	28.92
8i2	13.06	67.47	10.52	8.94
8i3	44.86	22.95	9.83	22.36
8i4	49.24	18.02	10.08	22.67
8j1	5.07	83.90	1.29	9.74
8j2	49.04	24.81	1.04	25.11
8j3	54.25	20.05	1.06	24.63
8j4	64.11	10.24	1.12	24.53
8j5	44.79	38.98	1.28	14.95
8k1	9.89	58.74	1.12	30.25
8k2	23.34	45.75	1.05	29.87
8k3	69.16	19.99	1.00	9.86
8k4	29.34	39.54	1.21	29.91
8k5	49.31	20.41	1.06	29.23
8k6	0.00	54.34	1.03	44.63
8l1	30.88	27.82	1.19	40.11
8l2	28.40	39.14	2.74	29.73
8l3	18.87	39.31	2.91	38.91

700°C				
Exp. No.	Cu	Ni	Fe	S
7a1	29.82	48.82	1.16	20.2
7a2	5.54	68.63	1	24.83
7a3	78.61	9.38	0.09	11.11
7a4				
7b2				
7b3				
7c1				
7c2				
7c3	10.07	64	1.31	24.62
7c4				
7d5				
7e1	28.67	57.21	9.17	4.96
7e2	18.52	59.09	8.84	13.55
7e3	54.07	23.28	9.42	13.24
7e4	27.21	32.47	9.09	31.23
7e5	10.03	49.79	8.83	31.35
7f1	0.00	51.04	8.87	40.09
7f2	4.28	42.13	8.83	44.76
7f3	29.18	62.30	3.54	4.98
7f4	19.62	62.65	3.14	14.60
7f5	57.73	24.81	3.11	14.36
7g1	29.39	34.45	2.81	33.36
7g2	0.00	53.28	3.47	43.25
7g3	3.88	44.93	2.94	48.24
7g4	19.45	64.42	1.25	14.89
7g5	8.96	55.78	1.05	34.20
7h1	28.91	35.77	1.21	34.10
7h2	58.32	25.50	1.04	15.13
7h3	0.00	54.52	1.10	44.38
7h4	5.51	44.92	1.04	48.53
7h5	28.69	61.56	4.79	4.96
7i1	19.86	60.85	4.73	14.57
7i2	54.12	26.73	4.10	15.05
7i3	26.81	34.59	5.49	33.12
7j2	0.00	51.74	5.31	42.95
7j3	4.50	42.81	4.93	47.75

8l4	0.00	53.65	2.96	43.39
8l5	29.61	28.54	2.94	38.92
8m2	19.12	38.54	4.87	37.46
8m3	28.57	38.04	4.89	28.50
8m4	48.14	19.04	4.74	28.07
8m5	26.88	36.79	9.11	27.22
8n1	45.07	18.95	8.80	27.18
8n2	19.02	35.97	9.07	35.94
8n3	0.00	50.22	8.67	41.11
8n5	27.26	27.92	8.89	35.93

APPENDIX C

Average and 95% confidence interval (ci) Data of Electron Microprobe Analyses for all the experiments. (*Melt = Recalculated melt analyses)

(Digenite°, β -phase°, Millerite° = Sulphide phases with exsolutions)

1200°C										
Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of analyses
1 wt%										
12i1	Melt	74.44	1.53	18.66	1.65	0.65	0.04	6.26	2.29	50
12i2	*Melt	48.74	1.03	41.76	1.49	1.09	0.13	8.41	1.82	50
12i3	Alloy	27.17	0.19	71.54	0.20	1.29	0.01	0.00	0.00	20
	*Melt	32.64	1.78	53.05	2.86	0.68	0.10	13.64	1.86	50
12i4	Alloy	9.16	0.10	89.29	0.11	1.55	0.02	0.00	0.00	20
	*Melt	15.42	2.76	64.85	3.50	0.52	0.10	19.21	1.41	50
12i5	*Melt	55.76	2.18	29.48	1.89	0.89	0.06	13.87	1.42	50
12i6	*Melt	31.48	2.28	53.04	3.16	1.29	0.19	14.20	1.57	50
3 wt%										
12m1	*Melt	71.19	0.31	19.34	1.01	2.01	0.05	7.47	0.96	50
12m2	*Melt	47.63	0.99	43.98	1.54	2.48	0.18	5.90	1.06	50
12m3	Alloy	26.09	0.30	70.55	0.34	3.37	0.06	0.00	0.00	10
	*Melt	29.69	1.47	58.53	2.02	1.37	0.16	10.41	1.71	50
12m4	Alloy	8.84	0.05	87.54	0.06	3.62	0.02	0.00	0.00	10
	*Melt	10.83	0.44	71.93	1.06	1.09	0.12	16.16	1.41	48
12m5	*Melt 1	64.55	1.60	13.33	1.42	1.34	0.05	20.78	0.26	40
	*Melt 2	61.14	0.86	25.51	1.46	2.06	0.09	11.29	0.77	50
12m6	*Melt	28.08	2.01	57.01	2.52	2.12	0.20	12.80	1.39	50
5 wt%										
12n1	Melt	72.00	1.27	17.41	5.89	3.84	0.61	6.76	6.09	50
12n2	Alloy	40.39	0.18	52.88	0.16	6.73	0.04	0.00	0.00	10
	Melt	48.78	4.10	42.31	6.75	4.01	1.10	4.91	5.14	50
12n4	Alloy	8.89	0.05	85.34	0.07	5.78	0.03	0.00	0.00	10
	*Melt	10.36	0.71	67.86	0.98	1.42	0.20	20.37	1.33	50
12n5	Melt	26.55	7.59	56.44	9.93	3.84	2.20	13.17	8.08	50
10 wt%										
12o1	*Melt	68.63	0.85	18.31	1.16	8.34	0.37	4.72	1.15	50
12o2	Alloy	36.67	0.43	50.21	0.39	13.12	0.22	0.00	0.00	20
	*Melt	50.65	1.15	33.93	2.01	6.82	0.47	8.61	1.33	50
12o3	Alloy	23.97	0.11	64.71	0.18	11.32	0.11	0.00	0.00	20
	*Melt	32.12	1.44	51.30	2.23	6.32	0.62	10.27	1.75	50
12o4	Alloy	8.01	0.17	81.05	0.21	10.94	0.09	0.00	0.00	20
	*Melt	12.31	1.01	63.63	1.27	4.03	0.28	20.04	0.93	50
12o5	*Melt 1	57.79	1.11	25.17	1.88	8.33	0.37	8.71	1.00	50
	*Melt 2	65.27	1.12	6.77	0.94	6.46	0.16	21.50	0.43	50
12o6	Alloy	20.08	0.13	65.78	0.12	14.14	0.08	0.00	0.00	20
	*Melt	28.32	2.09	51.38	2.46	7.30	0.71	13.01	1.79	50

1100°C										
Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
1 wt%										
11b1	*Melt	64.72	1.03	27.93	1.11	0.35	0.02	7.00	1.18	75
11b2	Alloy	51.33	0.75	47.69	0.75	0.98	0.01	0.00	0.00	20
	*Melt	48.41	1.64	39.54	1.64	0.47	0.03	11.58	1.19	75
11b3	Alloy	28.52	0.30	69.61	0.30	1.88	0.02	0.00	0.00	20
	*Melt	28.68	1.35	54.86	1.50	0.52	0.06	15.95	1.21	75
11b4	Alloy	8.55	0.12	88.69	0.15	2.76	0.04	0.00	0.00	20
	*Melt	9.85	0.29	70.53	1.03	0.68	0.09	18.94	1.27	75
11b5	*Melt	60.13	0.99	27.63	1.50	0.40	0.04	11.84	0.96	75
3 wt%										
11c1	Digenite°	71.40	0.76	0.54	0.86	5.80	0.28	22.26	0.47	40
	*Melt	90.60	0.66	5.57	0.21	1.70	0.09	2.13	0.64	75
11c2	Digenite°	71.53	1.95	4.22	3.21	3.86	0.39	20.39	1.94	30
	*Melt	80.15	0.28	13.44	0.55	2.12	0.03	4.29	0.75	75
11c4	*Melt 1	59.53	1.42	22.07	1.85	2.40	0.15	16.01	0.92	75
	*Melt 2	63.01	0.82	13.60	0.78	2.28	0.08	21.11	0.42	75
11c5	*Melt	73.06	0.21	17.62	0.99	2.94	0.05	6.38	0.90	75
11d1	Alloy	61.70	1.13	33.76	0.76	4.54	0.41	0.00	0.00	19
	*Melt	64.89	0.65	23.40	1.57	2.46	0.19	9.26	1.07	75
11d2	Alloy	46.60	0.38	49.45	0.35	3.95	0.07	0.00	0.00	20
	*Melt	46.69	1.19	38.35	0.93	1.52	0.12	13.44	1.33	75
11d3	Alloy	24.95	0.28	69.13	0.34	5.91	0.10	0.00	0.00	20
	*Melt	30.27	1.06	53.71	1.44	2.20	0.22	13.82	1.34	75
11d4	Alloy	8.35	0.13	86.50	0.17	5.14	0.06	0.00	0.00	20
	*Melt	10.35	0.21	70.75	0.97	1.49	0.18	17.41	1.22	75
11d5	*Melt	60.23	1.00	24.98	1.87	2.50	0.13	12.30	1.20	75
Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
5 wt%										
11e1	Alloy	47.08	1.03	46.65	0.79	6.27	0.26	0.00	0.00	19
	*Melt	48.11	1.13	34.71	0.74	2.52	0.22	14.66	1.93	60
11e2	*Melt	58.92	1.00	25.68	1.67	4.29	0.18	11.12	0.85	75
11e3	*Melt 1	66.97	0.74	7.60	0.71	4.37	0.08	21.06	0.21	75
	*Melt 2	66.77	0.62	20.69	1.56	3.66	0.12	8.89	1.04	75
11e4	*Melt 1	65.09	0.88	11.13	0.82	3.98	0.10	19.81	0.37	75
	*Melt 2	56.94	1.26	25.78	1.81	4.00	0.22	13.28	1.13	75
11e5	Alloy	68.03	0.55	25.86	0.36	6.11	0.20	0.00	0.00	20
	*Melt	71.97	0.49	18.42	1.67	4.03	0.27	5.58	1.63	75
11f1	Alloy	58.38	0.80	35.19	0.60	6.44	0.22	0.00	0.00	20
	*Melt	64.20	0.84	24.61	1.76	3.70	0.15	7.49	1.03	50
11f2	Alloy	23.67	0.17	68.80	0.13	7.53	0.10	0.00	0.00	20
	*Melt	30.51	1.78	52.02	1.64	3.00	0.27	14.47	1.20	50
11f3	Alloy	6.91	0.12	85.79	0.08	7.30	0.08	0.00	0.00	19
	*Melt	10.06	0.44	68.36	1.35	2.23	0.45	19.35	1.62	50

10 wt%										
11g2	Alloy	77.88	0.14	14.10	0.13	8.03	0.04	0.00	0.00	20
	Digenite°	65.96	1.32	1.75	1.20	9.90	0.56	22.40	1.33	75
11g3	Alloy	62.33	0.25	26.99	0.22	10.68	0.14	0.00	0.00	20
	Digenite°	67.01	2.88	4.20	3.46	7.48	0.88	21.31	1.49	75
11g4	Alloy	58.44	0.26	31.75	0.23	9.80	0.09	0.00	0.00	20
	Digenite°	66.46	3.61	4.96	3.04	5.87	0.46	22.71	0.81	40
11g5	Alloy	68.58	0.16	22.20	0.16	9.22	0.06	0.00	0.00	20
	Digenite°	69.92	0.80	0.57	0.51	6.70	0.33	22.81	0.25	60
11h1	Alloy	44.65	0.31	41.62	0.38	13.73	0.34	0.00	0.00	20
	*Melt	54.29	1.40	25.07	2.06	8.07	0.45	12.57	1.16	75
11h2	Alloy	42.83	0.55	46.02	0.45	11.14	0.16	0.00	0.00	20
	*Melt	50.04	0.92	31.59	1.39	5.73	0.25	12.65	0.90	75
11h3	Alloy	22.11	0.20	64.43	0.24	13.46	0.16	0.00	0.00	20
	*Melt	32.83	0.70	45.85	0.99	6.19	0.37	15.21	0.97	75
11h4	Alloy	8.20	0.14	79.22	0.18	12.58	0.15	0.00	0.00	20
	*Melt	12.25	0.72	64.70	1.25	6.17	0.50	16.87	1.40	75
11h5	Alloy	48.31	0.43	39.50	0.37	12.19	0.23	0.00	0.00	20
	Digenite°	67.00	3.09	7.21	2.25	5.31	0.28	20.48	1.32	50
	*Melt	57.33	1.62	21.73	2.36	7.15	0.43	13.79	1.24	75

1000°C										
Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
1 wt% Fe										
10i4	Alloy	28.43	1.59	69.39	1.56	2.18	0.06	0.00	0.00	32
	*Melt	29.12	1.93	50.36	2.17	0.36	0.10	20.15	1.61	20
10i5	*Melt	7.33	0.80	70.35	1.35	0.25	0.11	22.06	2.46	20
10j1	Alloy	62.70	0.93	36.11	0.71	1.18	0.44	0.00	0.00	45
	Digenite°	74.71	2.88	3.66	2.59	0.96	0.11	20.67	0.33	20
	*Melt	44.48	6.21	38.52	6.34	1.04	0.16	15.95	1.57	40
10j3	Alloy	60.61	0.75	37.95	0.70	1.44	0.22	0.00	0.00	48
	Digenite°	77.45	2.42	1.63	2.22	0.81	0.13	20.11	0.26	29
10i3	Alloy	20.39	0.61	78.24	0.60	1.36	0.01	0.00	0.00	20
	*Melt	19.41	1.78	60.52	2.02	0.29	0.04	19.79	1.29	44
10i4	Alloy	9.85	0.19	88.67	0.20	1.48	0.01	0.00	0.00	20
	*Melt	7.54	0.56	71.67	0.68	0.28	0.05	20.50	1.17	42
10i5	*Melt	69.85	0.83	4.88	0.60	0.85	0.01	24.42	0.24	20
10m3	*Melt	36.44	4.71	43.58	4.20	0.51	0.07	19.47	1.19	50
10m4	Digenite°	77.21	1.87	2.84	1.75	0.40	0.05	19.55	0.28	75
	*Melt	39.36	3.12	42.10	3.79	0.64	0.04	17.90	0.71	20

Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
3 wt% Fe										
10f1	Alloy	34.66	0.88	60.95	0.88	4.39	0.14	0.00	0.00	23
10f4	Alloy	52.71	0.38	43.04	0.39	4.25	0.06	0.00	0.00	20
10g1	Digenite°	75.44	1.55	1.67	1.25	2.22	0.44	20.66	0.46	111
	*Melt	36.14	4.16	40.49	3.68	3.42	0.66	19.95	2.10	20
10g2	Alloy	8.39	0.10	86.33	0.12	5.28	0.04	0.00	0.00	10
	Melt	10.66	1.29	67.20	5.06	1.05	0.99	21.09	5.94	20
10g3	Alloy	17.90	0.90	76.81	0.86	5.29	0.06	0.00	0.00	16
	Melt	19.03	5.32	60.05	5.97	1.45	0.41	19.49	2.84	20
10j4	Alloy	75.05	0.91	21.99	0.72	2.96	0.26	0.00	0.00	77
	Digenite°	74.19	1.41	1.48	1.49	3.51	0.21	20.82	0.34	30
10m5	Alloy	29.89	0.36	65.79	0.37	4.31	0.04	0.00	0.00	21
	*Melt	31.50	2.45	48.89	2.37	1.25	0.18	18.35	1.55	50
10n2	Alloy	62.28	0.42	35.56	0.42	2.15	0.02	0.00	0.00	20
	Digenite°	76.84	1.36	2.02	1.21	1.07	0.04	20.07	0.24	30
10n3	Alloy	56.40	0.55	40.23	0.56	3.37	0.05	0.00	0.00	20
	Digenite°	76.04	1.34	2.26	1.13	1.50	0.10	20.20	0.25	30
10n4	*Melt	68.25	0.48	5.19	0.37	3.02	0.02	23.54	0.13	75
10n5	*Melt	9.21	0.29	66.85	0.38	2.16	0.07	21.79	0.31	93
10o2	*Melt	39.88	1.72	41.50	1.46	2.02	0.16	16.60	1.09	75
10o3	Digenite°	74.03	2.09	3.28	1.94	1.69	0.06	21.00	0.25	75
	*Melt	33.39	3.41	42.83	3.42	2.29	0.07	21.49	0.33	30
5 wt% Fe										
10a	Alloy	28.40	0.41	63.71	0.50	7.88	0.29	0.00	0.00	31
	*Melt	28.34	2.22	49.76	2.48	2.80	0.72	19.10	2.99	20
10b	Alloy	52.40	0.32	41.08	0.32	6.52	0.13	0.00	0.00	22
	Digenite°	65.94	2.52	9.50	2.54	2.93	0.42	21.71	1.18	28
10e1	Alloy	8.10	0.14	83.97	0.13	7.93	0.07	0.00	0.00	30
	Melt	10.47	2.84	68.03	5.98	2.31	1.96	19.19	7.97	20
10e2	Alloy	80.07	0.92	16.53	0.89	3.40	0.13	0.00	0.00	63
	Digenite°	73.70	2.21	0.31	0.70	4.88	0.41	21.10	1.61	125
10e3	Alloy	16.53	0.14	75.36	0.17	8.12	0.06	0.00	0.00	20
	*Melt	19.95	4.80	56.26	4.57	1.62	0.30	22.17	1.50	20
10k1	Alloy	52.90	0.59	42.49	0.45	4.61	0.40	0.00	0.00	135
	Digenite°	73.96	2.71	2.88	2.34	2.24	0.15	20.92	0.69	33
10k2	Alloy	57.28	1.30	37.87	1.09	4.83	0.75	0.00	0.00	90
	Digenite°	75.17	1.87	1.24	1.66	2.99	0.20	20.60	0.49	32
10o4	Alloy	44.06	0.45	50.46	0.43	5.48	0.05	0.00	0.00	20
	Digenite°	74.89	2.28	2.26	2.02	1.83	0.29	21.01	0.22	30
10p2	Alloy	38.55	1.12	54.24	1.03	7.22	0.12	0.00	0.00	20
	Digenite°	73.59	2.07	2.72	1.85	2.25	0.20	21.44	0.28	30
	*Melt	40.25	1.88	37.06	1.75	3.51	0.14	19.18	0.45	60
10p4	Melt	7.79	1.69	65.91	2.59	3.73	0.85	22.57	2.73	74

Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
10 wt% Fe										
10g4	Alloy	76.16	2.48	14.78	1.05	9.06	1.46	0.00	0.00	188
	Digenite	67.12	0.50	0.19	0.07	8.70	0.28	23.99	0.30	20
10h3	Alloy	46.65	0.25	40.92	0.25	12.06	0.16	0.00	0.00	25
	Digenite°	67.51	2.49	5.06	2.31	5.34	0.33	22.09	0.29	18
10h4	Alloy	13.37	0.47	72.74	0.53	13.74	0.18	0.00	0.00	20
	*Melt	22.68	2.82	49.88	2.68	3.99	0.19	23.45	0.47	24
10i1	Alloy	5.29	0.53	80.64	0.77	14.07	0.38	0.00	0.00	24
10k4	Alloy	55.86	2.98	34.73	2.22	9.42	1.40	0.00	0.00	64
	Digenite°	72.42	1.34	0.95	1.07	5.28	0.16	21.35	0.43	20
10k5	Alloy	24.82	1.35	59.65	0.89	15.53	0.54	0.00	0.00	209
	Digenite°	70.15	3.66	2.12	3.03	6.18	0.58	21.55	0.54	24
	*Melt	33.97	4.14	35.48	4.13	7.07	0.57	23.49	1.22	20
10q2	Digenite°	64.95	2.91	2.90	1.75	9.03	0.85	23.12	0.42	51
10q4	*Melt	10.00	1.03	59.76	1.66	8.70	0.60	21.55	1.73	50
10q5	Alloy	23.26	0.25	62.01	0.43	14.73	0.20	0.00	0.00	20
	*Melt	33.18	1.63	36.57	1.40	6.78	0.40	23.46	1.10	50

900°C										
Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
1 wt% Fe										
9b1	Alloy	45.70	0.54	52.46	0.51	1.85	0.03	0.00	0.00	20
	Digenite°	76.93	1.74	2.29	1.62	0.45	0.12	20.33	0.35	15
	Melt	33.65	1.31	46.96	1.33	0.82	0.05	18.56	0.37	8
9b2	Alloy	19.72	0.56	79.58	0.65	0.70	0.41	0.00	0.00	40
	Melt	13.67	3.78	66.92	4.14	0.36	0.02	19.06	0.89	10
9b4	Digenite°	78.82	0.93	0.29	0.49	0.65	0.58	20.26	0.65	119
	*Melt	27.65	5.8	46.88	6.2	1.10	0.12	24.37	0.54	15
9c1	Alloy	45.91	0.82	52.83	0.81	1.26	0.03	0.00	0.00	75
	Digenite°	77.26	1.57	1.73	1.42	0.44	0.06	20.57	0.26	40
9c2	Alloy	43.87	0.45	53.49	0.44	2.64	0.04	0.00	0.00	48
	Digenite	77.84	1.12	1.11	1.06	0.85	0.06	20.20	0.24	22
9e1	Alloy	61.96	0.39	36.48	0.38	1.57	0.03	0.00	0.00	77
	Digenite	78.49	0.39	0.53	0.29	0.87	0.13	20.11	0.32	34
9e2	Alloy	44.75	0.17	53.31	0.16	1.94	0.01	0.00	0.00	20
	Digenite°	77.74	1.70	2.10	1.57	0.59	0.04	19.56	0.22	65
	*Melt	30.35	7.50	49.46	6.73	0.78	0.18	19.41	2.02	20
9e3	β-phase°	67.61	5.28	7.91	4.23	1.35	0.06	23.13	1.13	20
	*Melt	49.28	6.65	23.46	5.22	0.98	0.06	26.27	1.22	20
9e4	Millerite	3.91	0.32	59.32	0.52	0.97	0.02	35.81	0.34	50
	*Melt	13.25	1.14	51.19	0.85	0.85	0.02	34.71	0.30	121
9h1	Alloy	43.00	0.81	54.79	0.72	2.21	0.09	0.00	0.00	20
	Digenite°	77.80	0.86	1.40	0.67	0.43	0.07	20.38	0.38	34
	*Melt	32.51	7.83	48.11	7.35	0.91	0.17	18.47	1.74	20
9h2	Millerite	2.80	0.79	59.50	0.79	1.04	0.02	36.65	0.68	20
	Vaesite	1.27	0.14	46.17	0.71	0.13	0.01	52.43	0.74	20
	Melt	30.05	2.78	34.07	2.45	0.90	0.05	34.98	1.37	36
9h3	β-phase°	71.39	2.81	6.11	2.42	0.78	0.06	21.73	0.58	25
	*Melt	38.55	3.60	34.89	3.01	0.62	0.03	25.94	0.50	48
9h4	*Melt	45.52	2.15	20.94	1.28	1.28	0.05	32.26	1.18	32
9h5	*Melt	23.64	2.96	40.43	2.44	1.18	0.02	34.75	0.62	33
9i1	Millerite	0.11	0.02	59.91	0.26	1.49	0.02	38.49	0.26	87
	Vaesite	0.09	0.02	46.49	0.32	0.24	0.07	53.17	0.31	77
9n3	β-phase°	66.79	3.57	6.14	2.18	1.13	0.11	25.94	1.49	20

Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
3 wt% Fe										
9c3	Alloy	50.71	0.32	43.91	0.31	5.38	0.07	0.00	0.00	47
	Digenite	76.12	0.54	0.67	0.56	2.13	0.15	21.07	0.17	17
9c4	Alloy	38.67	0.43	57.48	0.43	3.85	0.04	0.00	0.00	48
	Digenite°	77.74	1.97	1.19	1.56	0.93	0.06	20.14	0.53	36
9f1	Alloy	62.97	1.57	33.29	1.24	3.73	0.34	0.00	0.00	38
	Digenite	78.02	0.74	0.30	0.20	1.81	0.45	19.88	0.35	40
9f2	Alloy	34.26	0.55	59.51	0.57	6.23	0.06	0.00	0.00	46
	Digenite°	78.41	1.28	0.69	1.10	1.37	0.27	19.53	0.26	37
	*Melt	25.24	2.62	50.57	2.55	2.27	0.17	21.92	0.77	106
9f3	Millerite	2.91	0.97	57.80	0.99	3.68	0.04	35.61	0.33	17
	*Melt	14.31	2.54	52.46	2.23	2.71	0.09	30.51	0.41	30
9i2	Digenite°	77.27	1.26	1.43	1.15	1.05	0.08	20.25	0.22	55
	*Melt	20.81	3.68	55.14	3.30	1.27	0.07	22.78	0.29	49
9i3	β-phase°	69.31	2.99	5.80	2.71	2.81	0.09	22.07	0.42	96
	Melt	21.31	1.91	49.96	1.85	1.68	0.06	27.05	0.35	37
9i4	Millerite	3.12	0.27	55.37	0.31	3.32	0.04	38.19	0.27	82
	Vaesite	1.42	0.02	44.45	0.43	0.43	0.01	53.69	0.43	96
	Melt	36.61	10.41	29.10	9.37	2.75	0.11	31.54	1.71	45
9i5	β-phase°	68.50	4.16	6.19	3.77	3.17	0.10	22.14	0.52	47
	*Melt	25.50	2.94	45.83	2.78	2.40	0.04	26.28	0.30	83
9j1	Melt	43.04	12.60	20.10	7.40	2.72	0.67	34.13	6.07	50
9j2	Melt	21.39	12.13	40.80	10.02	2.91	0.12	34.90	2.31	50
9j3	Millerite	0.10	0.02	56.31	0.54	4.22	0.07	39.37	0.48	105
	Vaesite	0.08	0.02	45.93	0.36	0.58	0.16	53.41	0.43	91
9j4	*Melt	63.56	0.71	6.33	0.46	2.69	0.05	27.42	0.33	50
9n5	Alloy	9.41	0.06	85.82	0.08	4.77	0.03	0.00	0.00	10
	Melt	8.71	1.44	68.10	1.26	0.62	0.11	22.57	1.59	20
5 wt% Fe										
9c5	Alloy	42.20	1.13	52.04	0.92	5.76	0.24	0.00	0.00	54
	Digenite	76.19	0.99	1.23	1.09	1.95	0.12	20.63	0.50	25
9d1	Melt	29.86	1.11	45.16	0.89	3.63	0.14	21.35	0.61	184
9d2	Alloy	55.12	1.82	37.13	1.67	7.75	0.20	0.00	0.00	86
	Digenite	74.72	0.60	0.48	0.25	2.98	0.39	21.81	0.26	35
9f4	Alloy	63.74	0.47	30.42	0.41	5.84	0.10	0.00	0.00	33
	Digenite	75.66	0.68	0.22	0.25	3.16	0.39	20.96	0.37	69
9j5	Alloy	25.50	0.20	64.99	0.27	9.51	0.13	0.00	0.00	88
	Digenite°	75.03	1.18	2.07	1.18	1.66	0.10	21.24	0.28	63
	*Melt	32.03	7.44	44.99	6.47	3.07	0.62	19.92	2.00	20
9k1	Digenite°	65.43	0.94	7.03	0.75	4.75	0.07	22.79	0.54	37
	*Melt	35.74	2.96	34.40	2.76	3.96	0.09	25.89	0.32	40
9k2	Millerite	0.80	0.04	56.23	0.72	6.34	0.07	36.63	0.71	20
	*Melt	9.46	0.78	57.00	0.74	3.75	0.03	29.78	0.22	40
9k4	Digenite°	70.00	2.47	4.06	2.21	4.49	0.26	21.46	0.44	20
	*Melt	21.28	2.12	48.78	1.88	5.36	0.19	24.58	0.15	48
9k5	*Melt	44.51	1.51	19.40	0.84	2.11	0.06	33.97	0.77	32
9i1	Millerite	2.52	0.55	54.47	0.59	5.74	0.08	37.26	0.63	20
	*Melt	39.56	2.41	25.04	2.13	4.59	0.06	30.81	0.61	40
9i2	Millerite	0.07	0.01	57.07	0.59	6.03	0.07	36.83	0.65	20
	Vaesite	0.04	0.01	46.99	0.64	0.87	0.12	52.10	0.62	20
9o2	Alloy	18.33	0.44	74.35	0.37	7.32	0.15	0.00	0.00	20
	*Melt	21.25	2.02	56.28	1.80	1.97	0.18	20.50	0.88	75
9o3	Alloy	23.62	0.23	64.83	0.22	11.55	0.07	0.00	0.00	20
	Digenite°	72.8	1.71	2.28	1.59	3.09	0.07	21.83	0.22	70
	*Melt	30.72	3.20	44.08	3.14	4.72	0.29	20.47	0.82	75

Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
10 wt% Fe										
9a3	Alloy	21.17	2.00	51.15	1.15	27.69	0.76	0.00	0.00	15
	Digenite	73.46	0.75	0.00	0.00	5.20	0.51	21.34	0.50	273
9d3	Alloy	37.61	1.38	46.01	1.30	16.38	0.30	0.00	0.00	22
	Digenite	72.66	0.67	0.30	0.19	4.40	0.41	22.64	0.27	67
9d4	Alloy	15.32	0.22	67.73	0.30	16.95	0.14	0.00	0.00	18
	Digenite°	69.95	1.79	2.69	1.41	5.18	0.26	22.19	0.26	38
9d5	Alloy	42.07	4.47	37.45	2.63	20.48	1.93	0.00	0.00	50
	Digenite	70.10	0.76	0.42	0.47	6.16	0.49	23.32	0.37	61
9g1	Alloy	61.53	0.55	28.23	0.36	10.23	0.23	0.00	0.00	11
	Digenite	72.17	0.97	0.63	0.89	5.53	0.28	21.67	0.29	40
9g2	β-phase°	65.08	2.97	3.63	1.86	7.46	0.84	23.83	0.35	34
	*Melt	23.53	3.82	39.45	3.41	11.24	0.37	25.78	0.38	35
9g3	Melt	4.71	1.97	52.82	2.31	12.04	1.10	30.43	0.41	47
9g4	Millerite	2.97	0.07	47.15	0.40	11.40	0.20	38.49	0.38	55
	*Melt	29.42	4.20	30.03	3.49	8.39	0.13	32.15	0.95	20
9i3	Alloy	16.92	0.80	67.21	0.66	15.87	0.22	0.00	0.00	25
	Digenite°	70.54	1.33	2.34	1.17	4.39	0.14	22.73	0.18	29
	*Melt	26.45	3.94	44.29	3.74	6.13	0.23	23.12	0.61	28
9i4	β-phase°	65.16	3.56	3.98	2.35	7.68	0.86	23.18	0.42	40
	*Melt	24.11	3.65	42.05	3.23	10.38	0.27	23.46	0.32	40
9i5	Melt	41.44	0.31	18.58	0.23	8.51	0.11	31.47	0.23	50
9m1	Millerite	3.65	1.10	49.95	0.92	10.80	0.18	35.60	0.33	50
	*Melt	26.23	1.38	35.20	1.29	7.88	0.11	30.70	0.18	29
9m2	Millerite	0.14	0.02	49.63	0.27	11.56	0.18	38.67	0.26	98
	Vaesite	0.10	0.02	44.91	0.24	1.64	0.04	53.35	0.24	100
9m3	*Melt	58.08	1.07	3.98	0.71	9.47	0.14	28.47	0.45	92
9o4	Alloy	20.97	0.78	66.22	0.52	12.82	0.39	0.00	0.00	20
	Digenite°	72.42	1.35	2.1	1.22	3.51	0.17	21.98	0.28	40
9o5	Alloy	15.30	0.31	72.07	0.50	12.63	0.24	0.00	0.00	20
	*Melt	20.65	1.65	53.31	1.57	4.46	0.33	21.59	0.86	74
9o6	*Melt	10.99	0.65	61.98	0.92	4.24	0.32	22.78	0.90	75

800°C										
Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
1 wt%										
8e1	Alloy	81.49	0.21	17.97	0.21	0.54	0.02	0.00	0.00	20
	Digenite	78.00	0.45	0.41	0.84	1.35	0.08	20.25	0.67	40
8e2	*Melt	24.57	2.41	54.91	2.09	0.47	0.05	20.04	0.72	75
8e3	Alloy	30.39	0.33	67.64	0.36	1.97	0.04	0.00	0.00	20
	*Melt	21.79	1.55	56.75	1.52	0.40	0.06	21.06	0.90	75
8e4	Alloy	15.76	0.41	82.26	0.41	1.98	0.04	0.00	0.00	20
	*Melt	12.93	0.59	64.95	0.59	0.22	0.01	21.91	0.22	75
8j1	Alloy	5.19	0.07	92.55	0.08	2.26	0.03	0.00	0.00	20
	Melt	4.26	0.80	71.94	1.39	0.19	0.08	23.60	1.87	73
8j2	β-phase°	72.04	2.12	5.46	1.76	1.11	0.04	21.39	0.45	75
	*Melt	17.60	0.60	51.04	0.28	0.57	0.01	30.79	0.11	70
8j3	β-phase°	70.72	3.17	6.35	2.54	1.08	0.04	21.84	0.70	75
	*Melt	19.82	0.15	49.18	1.00	0.48	0.02	30.52	0.21	75
8j4	β-phase°	69.83	1.49	5.62	1.26	1.07	0.01	23.48	0.38	75
8j5	Digenite°	77.97	2.28	1.61	2.11	0.34	0.05	20.08	0.25	50
	*Melt	20.53	2.73	57.28	2.43	0.52	0.04	21.66	0.51	75
8k1	*Melt	9.30	0.96	57.99	0.90	1.27	0.04	31.44	0.36	33
8k2	*Melt	24.48	0.83	44.56	0.75	1.10	0.03	29.87	0.15	90
8k3	Alloy	60.93	0.46	37.97	0.46	1.09	0.02	0.00	0.00	20
	Digenite	77.90	0.88	0.42	0.57	0.69	0.29	20.99	0.60	14
8k4	*Melt	33.75	2.12	36.24	1.86	1.08	0.04	28.94	0.35	59
8k5	*Melt	48.96	1.03	19.57	1.07	1.20	0.02	30.28	0.46	70
8k6	Vaesite	0.04	0.01	46.74	0.49	0.20	0.01	53.02	0.49	18
	Millerite	0.06	0.01	60.10	0.69	1.71	0.05	38.13	0.71	20
8l1	β-phase°	70.45	1.82	3.37	1.46	2.40	0.10	23.79	0.47	50
	Vaesite	1.78	0.38	44.72	0.48	0.16	0.02	53.34	0.41	20

Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
3 wt%										
8a1	Melt	9.00	3.75	58.98	3.49	3.27	0.18	28.74	0.57	64
8a2	Alloy	3.77	0.11	90.57	0.08	5.66	0.11	0.00	0.00	89
	Melt	4.13	0.43	72.87	1.07	0.63	0.11	22.36	1.40	25
8a3	Alloy	13.35	0.41	80.69	0.38	5.97	0.08	0.00	0.00	72
	Melt	15.72	3.89	62.11	3.84	0.99	0.18	21.19	1.74	16
8a4	Alloy	25.06	0.34	70.28	0.32	4.65	0.11	0.00	0.00	47
	*Melt	23.58	2.84	54.96	2.61	1.09	0.14	20.38	1.04	18
8a5	*Melt	16.98	2.77	50.93	2.52	3.02	0.08	29.07	0.48	30
8f1	Alloy	81.42	0.16	16.76	0.17	1.82	0.04	0.00	0.00	20
	Digenite	75.38	0.57	0.42	0.26	3.18	0.42	21.03	0.26	20
8f2	*Melt	26.61	2.13	42.45	1.83	2.06	0.07	28.88	0.31	75
8f3	Millerite	1.56	0.87	59.19	0.69	1.70	0.02	37.54	0.26	40
	β-phase°	70.77	1.31	2.52	0.98	3.14	0.06	23.58	0.40	60
8f4	Alloy	60.03	0.47	35.44	0.36	4.53	0.16	0.00	0.00	18
	Digenite	77.91	0.46	0.16	0.06	1.57	0.30	20.36	0.27	17
8f5	Alloy	27.75	0.23	67.73	0.22	4.51	0.08	0.00	0.00	20
	Digenite°	76.44	0.99	1.48	0.87	0.80	0.10	21.27	0.21	60
8g1	Digenite°	76.76	0.78	4.53	0.76	0.98	0.07	20.73	0.19	38
	*Melt	21.46	2.36	55.50	1.98	1.69	0.14	21.35	0.69	75
8g2	Alloy	41.85	0.26	51.64	0.23	6.51	0.10	0.00	0.00	20
	Digenite	77.91	0.36	0.59	0.13	1.18	0.24	20.32	0.23	19

8l2	β -phase°	67.20	1.74	5.68	1.47	3.93	0.07	23.19	0.41	72
	Millerite°	5.15	0.31	56.55	0.39	2.64	0.04	35.67	0.36	20
	*Melt	27.72	2.13	41.13	1.86	2.00	0.06	29.15	0.33	75
8l3	β -phase°	69.51	1.36	1.15	1.21	5.40	0.13	23.94	0.33	40
	Millerite°	3.40	0.37	55.24	0.38	3.32	0.04	38.04	0.27	40
8l4	Millerite	0.04	0.01	58.14	0.20	3.59	0.04	38.24	0.18	20
	Vaesite	0.02	0.02	46.38	0.28	0.40	0.02	53.21	0.28	30
8l5	β -phase°	66.94	2.13	2.70	1.66	5.58	0.12	24.78	0.54	50
	Vaesite	3.06	2.23	43.58	1.80	0.87	0.40	52.49	0.82	20
Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
5 wt%										
8b1	Alloy	80.15	0.34	16.65	0.27	3.20	0.11	0.00	0.00	34
	Digenite	72.30	0.65	0.03	0.04	5.03	0.37	22.65	0.33	40
8b2	Alloy	15.38	0.13	77.23	0.24	7.39	0.14	0.00	0.00	7
	Melt	16.10	0.65	61.93	0.98	1.65	0.22	20.32	1.03	27
8b3	Digenite°	72.81	1.34	1.31	1.18	4.30	0.29	21.57	0.31	46
	*Melt	19.79	5.65	49.41	4.78	6.06	0.17	24.75	0.56	20
8b4	β -phase°	70.79	1.38	2.12	1.06	4.56	0.28	22.53	0.23	36
	*Melt									32
8b5	β -phase°	68.74	2.16	2.76	1.80	5.03	0.14	23.47	0.51	15
	*Melt	19.34	2.88	44.39	2.78	2.76	0.54	33.51	1.53	12
8c2	*Melt	9.32	1.95	57.21	1.64	5.58	0.04	27.89	0.28	20
8c3	Alloy	63.79	4.48	31.20	3.30	5.00	1.19	0.00	0.00	40
	Digenite°	74.90	1.13	0.37	0.87	3.38	0.52	21.36	0.40	47
8g3	Alloy	27.86	0.42	65.67	0.33	6.48	0.12	0.00	0.00	20
	Digenite	78.67	0.58	0.56	0.38	0.70	0.26	20.06	0.25	20
8g4	Alloy	21.90	0.18	70.28	0.22	7.82	0.17	0.00	0.00	20
	Digenite°	75.67	1.27	1.96	1.20	1.45	0.04	20.92	0.18	60
	*Melt	21.35	2.64	54.45	2.42	2.01	0.13	22.20	0.58	75
8g5	Alloy	6.33	0.10	87.50	0.24	6.17	0.16	0.00	0.00	20
	Melt	7.04	0.95	69.99	0.79	0.88	0.10	22.42	0.75	100
8h1	*Melt	20.59	3.74	55.00	3.53	3.57	0.40	20.84	1.19	100
8h3	*Melt	17.19	6.23	47.44	4.84	5.49	0.12	29.88	0.84	20
8m2	β -phase°	65.86	0.77	0.65	0.52	8.26	0.20	25.23	0.32	20
	Millerite°	3.48	0.71	52.48	0.56	6.27	0.09	37.77	0.30	49
	Vaesite	1.62	0.10	43.62	0.70	0.79	0.04	53.97	0.75	40
8m3	β -phase°	67.39	2.40	1.21	1.28	7.73	0.82	23.68	0.41	55
	Melt									91
8m4	β -phase°	67.44	2.59	2.41	2.12	5.59	0.14	24.56	0.61	69
	Millerite°	2.91	0.40	56.04	0.33	3.37	0.05	37.68	0.30	50
10 wt%										
8c4	Alloy	13.85	0.19	72.58	0.24	13.57	0.15	0.00	0.00	50
	Digenite°	75.16	1.75	0.60	1.05	3.01	0.51	21.27	0.74	20
	*Melt	20.90	1.72	53.40	1.38	4.52	0.11	21.18	0.44	12
8c5	Alloy	5.01	0.13	81.35	0.28	13.64	0.20	0.00	0.00	116
	Melt	8.43	0.34	65.64	0.56	3.56	0.13	22.38	0.31	9
8d1	β -phase°	64.32	5.36	3.81	2.38	7.83	1.97	24.04	1.04	11
	*Melt	13.19	2.27	51.23	1.55	12.33	0.18	23.24	1.08	20
8d2	*Melt	9.71	1.21	53.14	1.82	11.87	0.37	25.29	0.42	50
8d3	Melt	8.56	0.59	53.52	1.02	10.27	0.46	27.65	0.38	9
8d4	*Melt	16.04	1.88	46.68	1.97	9.51	0.08	27.78	0.11	15
8i2	Alloy	11.06	0.15	74.43	0.21	14.51	0.13	0.00	0.00	20
	*Melt	17.92	1.55	54.88	1.21	5.30	0.23	21.90	0.65	75

8i3	β -phase°	66.44	3.71	2.42	2.02	8.19	1.19	22.95	0.61	42
	Melt	11.85	5.94	51.10	3.85	12.49	0.78	24.56	2.72	80
8i4	*Melt	16.90	2.18	45.66	1.82	12.73	0.28	24.71	0.89	100
8m5	β -phase°	64.46	1.51	2.31	1.26	7.83	0.17	25.40	0.42	57
	Millerite°	3.23	0.44	53.44	0.37	5.69	0.09	37.63	0.33	60
8n1	β -phase°									
	*Melt	18.37	5.64	44.63	4.73	6.22	0.20	30.78	0.62	20
8n2	β -phase°	60.16	1.60	2.41	1.42	10.56	0.17	26.88	0.35	20
	Millerite	3.26	1.15	48.75	0.92	9.70	0.12	38.29	0.34	20
	Vaesite	1.51	0.03	43.72	0.21	1.19	0.04	53.58	0.20	24
8n3	Millerite	0.06	0.02	50.40	0.13	10.74	0.07	38.80	0.12	20
	Vaesite	0.06	0.01	44.71	0.69	1.75	0.65	53.48	0.10	20
8n5	β -phase°	59.33	1.41	2.27	1.27	11.22	0.19	27.18	0.34	20
	Millerite	2.87	0.79	47.98	0.63	10.93	0.15	38.21	0.25	20
	Vaesite	1.60	0.06	43.64	0.26	1.32	0.06	53.45	0.19	20

700°C										
Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
1 wt%										
7a1	Digenite°	79.20	0.55	0.09	0.11	0.60	0.17	20.11	0.45	96
	*Melt									
7a2	Melt	7.92	2.63	69.34	2.93	0.22	0.17	22.52	1.87	86
7a3	Alloy	78.76	4.69	20.65	4.56	0.59	0.20	0.00	0.00	29
	Digenite	79.87	0.74	0.10	0.11	0.82	0.24	19.22	0.54	21
7a4	Millerite	2.45	1.35	61.45	1.30	0.36	0.03	35.73	0.20	9
	β -phase°	75.19	2.47	1.77	1.82	0.95	0.15	22.09	0.78	136
7c3	*Melt	12.99	0.70	63.11	0.74	1.63	0.10	22.28	0.51	150
7g4	Alloy	24.84	0.34	72.01	0.31	3.15	0.04	0.00	0.00	27
	Digenite	79.05	0.27	0.26	0.18	0.35	0.08	20.34	0.20	30
	Melt									
7g5	β -phase°	72.80	1.92	2.62	1.41	1.74	0.05	22.84	0.53	30
	Millerite	0.88	0.19	61.71	0.51	0.84	0.02	36.57	0.37	20
7h1	β -phase°	74.11	1.75	1.85	1.25	1.83	0.04	22.20	0.65	40
	Vaesite	0.85	0.19	45.82	0.46	0.13	0.02	53.19	0.33	29
	Millerite	1.10	0.42	60.20	0.54	0.82	0.03	37.88	0.54	29
7h2	Alloy	27.29	0.53	71.04	0.52	1.67	0.02	0.00	0.00	18
	Digenite	78.49	1.04	0.66	0.90	0.10	0.02	20.75	0.51	30
	Melt	12.87	7.37	63.70	7.47	0.22	0.05	23.21	1.34	50
7h3	Vaesite	0.02	0.02	46.70	0.23	0.19	0.12	53.09	0.16	29
	Millerite	0.05	0.02	60.75	0.28	1.30	0.02	37.91	0.28	30
7h4	β -phase	76.51	0.42	0.13	0.07	0.24	0.02	23.11	0.42	40
	Millerite	0.47	0.16	59.17	0.27	1.73	0.03	38.63	0.29	30
	Vaesite	2.19	1.59	43.45	2.06	0.10	0.04	54.25	0.55	30

Exp. no.	Phase	Cu	ci	Ni	ci	Fe	ci	S	ci	No. of anal.
3 wt%										
7b2	Alloy	58.52	4.22	37.03	3.38	4.44	0.94	0.00	0.00	49
	Digenite	76.32	1.12	0.36	0.95	1.64	0.23	21.68	0.32	57
7c4	Alloy	22.23	0.43	74.74	0.42	3.02	0.08	0.00	0.00	97
	Digenite	79.43	0.51	0.18	0.22	0.40	0.10	19.99	0.46	55
7f3	Alloy	24.08	0.29	72.09	0.30	3.83	0.03	0.00	0.00	25
	Digenite	79.41	0.43	0.19	0.22	0.48	0.23	19.92	0.20	40
	*Melt									16
7f4	*Melt	10.40	2.52	63.65	2.07	1.51	0.09	24.45	0.47	45
7f5	Alloy									25
	Digenite	78.10	0.52	0.65	0.23	1.00	0.26	20.25	0.30	30
7g1	β -phase ^o	70.46	0.89	1.38	0.68	4.63	0.08	23.53	0.28	30
	Vaesite	1.06	0.08	46.20	0.19	0.26	0.02	52.48	0.16	30
	Millerite	1.61	0.69	57.75	0.62	2.23	0.05	38.40	0.64	30
7g2	Vaesite	0.06	0.02	46.11	0.39	0.53	0.17	53.30	0.33	30
	Millerite	0.08	0.02	58.72	0.29	3.64	0.06	37.57	0.28	30
7g3	β -phase									
	Vaesite	1.22	1.24	45.67	1.17	0.51	0.13	52.61	0.25	30
	Millerite									
5 wt%										
7c1	Alloy	14.29	0.65	78.19	0.55	7.52	0.17	0.00	0.00	20
	Digenite	77.60	1.15	0.38	0.84	0.95	0.20	21.07	0.69	191
7h5	Alloy									
	Digenite	77.49	0.80	0.31	0.53	0.81	0.23	21.39	0.47	39
	*Melt	11.47	3.02	60.37	2.80	3.26	1.04	24.90	0.50	30
7i1	Alloy	12.53	0.45	77.60	0.45	9.86	0.09	0.00	0.00	20
	Digenite	77.39	1.15	0.41	0.93	1.53	0.19	20.67	0.47	18
	*Melt	11.30	1.76	62.58	1.39	1.93	0.10	24.19	0.33	39
7i2	Alloy	12.87	0.78	77.09	0.58	10.04	0.28	0.00	0.00	16
	Digenite ^o	75.08	1.36	1.25	1.20	2.20	0.10	21.48	0.43	30
7i3	β -phase ^o	66.42	0.65	0.80	0.37	7.99	0.22	24.78	0.43	55
	Vaesite	1.37	0.42	45.58	0.38	0.60	0.08	52.46	0.41	9
	Millerite	1.43	0.45	55.48	0.48	4.65	0.09	38.44	0.57	24
7j2	Vaesite	0.12	0.06	45.79	1.19	1.47	1.02	52.63	0.27	20
	Millerite	0.09	0.01	55.90	0.32	6.33	0.09	37.67	0.36	20
7j3	β -phase	68.21	0.63	0.26	0.25	4.71	0.15	26.82	0.53	23
	Millerite	0.97	0.27	54.20	0.36	7.04	0.14	37.80	0.40	20
	Vaesite	0.74	0.13	45.75	0.30	0.77	0.04	52.74	0.28	20

Exp. no.	Phase	Cu	<i>ci</i>	Ni	<i>ci</i>	Fe	<i>ci</i>	S	<i>ci</i>	No. of anal.
10 wt%										
7b3	Alloy	17.98	0.32	70.01	0.27	12.01	0.16	0.00	0.00	49
	Digenite	75.97	1.73	0.78	1.83	2.03	0.25	21.22	0.53	111
7c2	Alloy	13.86	0.29	77.61	0.25	8.53	0.16	0.00	0.00	27
	Digenite	77.98	1.15	0.38	1.05	1.11	0.24	20.52	0.33	86
7d5	Melt	8.65	3.19	56.37	3.27	10.46	1.16	24.51	1.52	75
7e1	Alloy	14.80	0.84	72.85	0.74	12.35	0.82	0.00	0.00	29
	Digenite°	76.46	1.41	0.68	0.56	2.24	0.58	20.62	0.58	35
7e2	Alloy	9.39	0.28	75.76	0.37	14.85	0.17	0.00	0.00	30
	Digenite°	72.13	1.60	0.82	1.36	3.60	0.10	23.46	0.30	19
7e3	Alloy	66.73	3.44	29.29	2.57	3.98	0.89	0.00	0.00	19
	Digenite	74.48	0.55	0.32	0.23	3.71	0.37	21.49	0.25	15
7e4	β-phase	63.69	2.16	2.66	1.59	8.98	0.28	24.67	1.10	21
	Millerite	1.71	0.22	52.93	0.52	9.27	0.13	36.09	0.57	12
7e5	β-phase	66.54	0.62	1.03	0.15	8.13	0.53	24.30	0.35	10
	Millerite°	1.63	0.45	53.08	0.87	10.40	0.51	34.90	0.81	17
7f1	Vaesite	0.08	0.01	44.76	0.23	1.30	0.08	53.87	0.20	30
	Millerite	0.09	0.02	51.75	0.38	9.79	0.08	38.36	0.34	40
7f2	Vaesite	0.75	0.12	43.99	0.36	1.51	0.26	53.75	0.32	40
	Millerite	1.73	0.61	47.00	0.64	12.37	0.14	38.90	0.37	38

APPENDIX D

Experiment labels according to starting Fe content:

The phase relations and experiment labels at 1200°C.

Starting content	Fe	2-Melt field	Alloy + Melt	Melt
1 wt% Fe		12i5	12i2 12i3 12i4 12i6	12i1
3 wt% Fe		12m5	12m2 12m3 12m4	12m1 12m6
5 wt% Fe		12n1	12n2 12n4 12n5	
10 wt% Fe		12o5	12o2 12o3 12o4 12o6	12o1

The phase relations and experiment labels at 1100°C.

Starting content	Fe	2-Melt field	Alloy + Melt	Alloy + Digenite + Melt	Alloy + Digenite
1 wt% Fe		11b5	11b1 11b2 11b3 11b4		
3 wt% Fe		11c1 11c2 11c4	11c5 11d1 11d2 11d3 11d4		
5 wt% Fe		11e3 11e4	11e1 11e5 11f1 11f2 11f3		
10 wt% Fe			11h1 11h2 11h3 11h4	11h5	11g2 11g3 11g4 11g5

The phase relations and experiment labels at 1000°C.

Starting Fe content	Alloy + Digenite	Alloy + Digenite + Melt	Alloy + Melt	Digenite + Melt	Melt
1 wt% Fe		10j1 10j3	10i4 10i3 10i4	10i2,3 10m4	10i5 10i5 10m3
3 wt% Fe	10j4 10n2 10n3	10f4	10f1 10g2 10g3 10m5 10o2	10g1 10o3	10n4 10n5
5 wt% Fe	10b 10e2 10k1 10k2 10o4	10p2	10a 10e1 10e3	10p1 10p3	10p4
10 wt% Fe	10g4 10h3 10k4	10h1 10k5 10q5	10h4 10i1 10q4		Digenite: 10q2

The phase relations and experiment labels at 900°C.

Starting Fe content	Alloy + Digenite	Alloy + Digenite + Melt	Alloy + Melt	β -phase + Melt	Digenite + Melt	Millerite + Melt	Millerite + Vaesite + Melt	Millerite + Vaesite	Melt
1 wt% Fe	9e1	9b1 9c1 9c2 9e2 9h1	9b2	9h3 9e3	9b4	9e4 9h5	9h2	9i1	9h4 9n3
3 wt% Fe	9f1 9c3	9c4 9f2 9i2 9n4 9n6	9n5	9i3 9i5		9f3	9j2 9i4	9j3	9j1 9j4
5 wt% Fe	9c5 9d2 9f4	9d1 9j5 9o1 9o3	9o2	9k1	9k4	9k2	9k3 9i1	9i2	9k5
10 wt% Fe	9g1 9d5 9d3 9a3	9i3 9d4 9o4	9o5 9o6	9i4 9g2		9g4 9m1		9m2	9g3 9i5 9m3

The phase relations and experiment labels at 800°C.

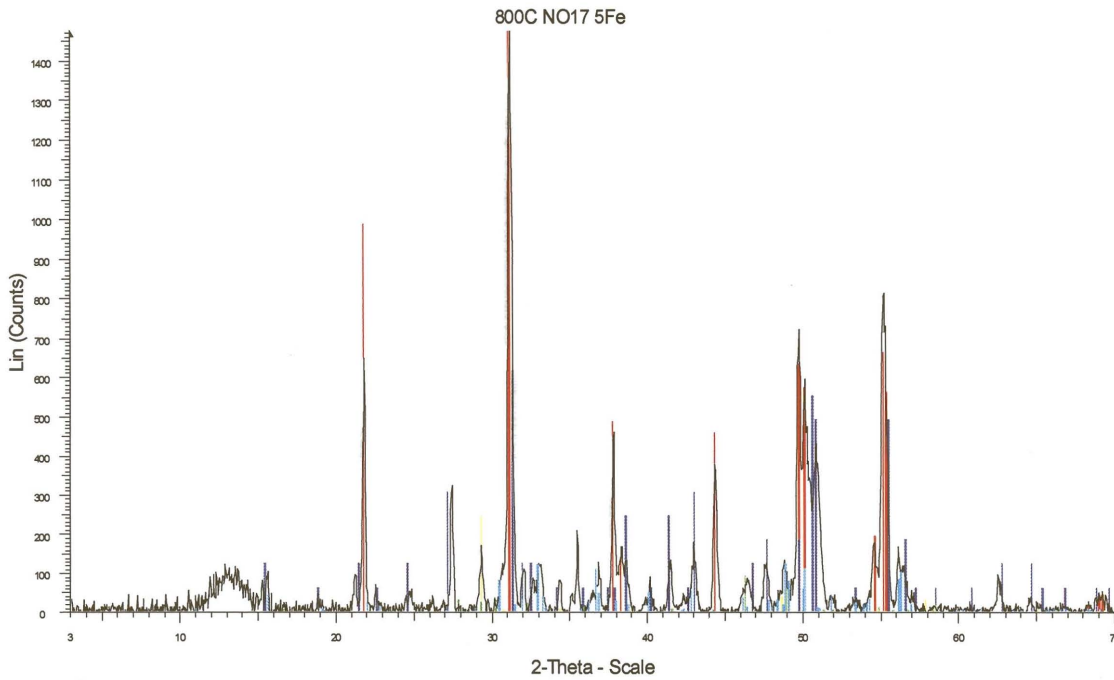
Starting Fe content	Alloy + Digenite	Alloy + Digenite + Melt	Alloy + Melt	β + Melt	Millerite + Melt	Millerite + Vaesite	Millerite + β + Melt	Millerite + Vaesite + β	Millerite + β	Vaesite + β	Melt
1 wt% Fe	8e1 8k3	8e2 8e3 8j5	8e4 8j1	8j2 8j3 8j4	8k4	8k6				8l1	8k1 8k2 8k5
3 wt% Fe	8f1 8f4 8f5 8g2	8g1	8a2 8a3 8a4	8f2		8l4	8l2	8i3 8i5	8f3		8a1 8a5
5 wt% Fe	8b1 8c1 8c3 8g3	8g4 8h1	8b2 8g5	8b3 8b4 8b5 8m3				8m2	8m4		8c2 8h3
10 wt% Fe		8c4	8i2 8c5	8d1 8d2 8d4 8i3 8i4 8n1		8n3		8n2 8n5	8m5		8d3

The phase relations and experiment labels at 700°C.

Starting Fe content	Alloy + Digenite	Alloy + Digenite + Melt	Alloy + Melt	β + Melt	Millerite + Vaesite + β	Millerite + β	Millerite + Vaesite	Melt
1 wt% Fe	7a3	7a1 7h2 7g4			7h1 7h4	7g5	7h3	7a2 7c3 7d1
3 wt% Fe	7b2	7c4 7f3 7f4 7f5			7g1 7g3		7g2	
5 wt% Fe		7i1 7i2 7h5	7d2		7i3 7j3		7j2	
10 wt% Fe	7b3 7c2 7e1 7e3	7e2 7d4	7d3		7f2	7e4 7e5	7f1	7d5

APPENDIX E

X-ray diffraction patterns of the β – phase and associated Ni-sulphides.



800C NO17 5Fe - File: WILLEM01-1.raw - Type: 2ThTh locked - Start: 3.000° - End: 70.000° - Step: 0.040° - Step time: 1.5 s - Temp.: 25 °C (Room) - Time Started: 0 s - 2-Theta: 3.000° - Theta: 1.500

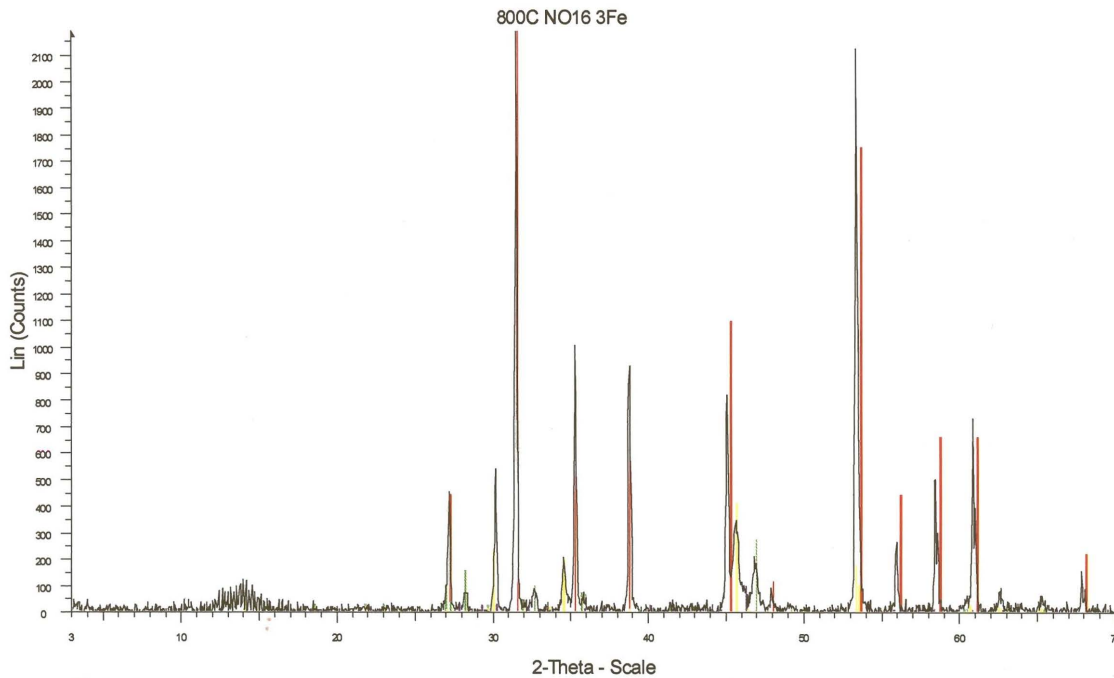
44-1418 (*) - Heazlewoodite - Ni3S2

122-1193 (N) - Godlevskite - Ni9S8

37-0471 (*) - Chalcopyrite - CuFeS2

71-0540 (C) - Nickel Sulfide - Ni2.52S19.44

126-0476 (C) - Digenite, syn - Cu9S5



800C NO16 3Fe - File: WILLEM01-2.raw - Type: 2ThTh locked - Start: 3.000° - End: 70.000° - Step: 0.040° - Step time: 1.5 s - Temp.: 25 °C (Room) - Time Started: 0 s - 2-Theta: 3.000° - Theta: 1.500

11-0099 (N) - Vaesite - NiS2

42-1405 (*) - Bornite - Cu5FeS4

76-2306 (C) - Nickel Sulfide - Ni17S18

126-0476 (C) - Digenite, syn - Cu9S5

