

APPENDIX 1

Representative EMPA data for sulfarsenides: gersdorffite I [1-11], cobaltite [12-17], gersdorffite II [18-27], arsenopyrite [28-31] and pyrite [32-35].

Analyses	wt. %								Total	apfu Σ 1 Cation							
	Sb	Bi	Cu	Ni	Fe	S	Co	As		Sb	Bi	Cu	Ni	Fe	S	Co	As
1	0.20	0.57	0.07	32.55	0.57	15.83	1.79	48.16	99.73	0.00	0.00	0.00	0.93	0.02	0.83	0.05	1.08
2	0.07	0.13	0.07	28.88	1.50	14.73	3.90	50.72	100.17	0.00	0.00	0.00	0.84	0.05	0.78	0.11	1.15
3	0.10	0.11	0.03	23.49	1.56	16.15	9.87	47.88	99.20	0.00	0.00	0.00	0.67	0.05	0.85	0.28	1.07
4	0.26	0.61	0.06	34.01	0.30	18.06	0.81	45.63	99.74	0.00	0.00	0.00	0.97	0.01	0.94	0.02	1.02
5	0.28	1.13	0.09	33.76	0.28	17.87	0.76	45.20	99.43	0.00	0.01	0.00	0.97	0.01	0.94	0.02	1.01
6	0.27	1.15	0.01	33.45	0.51	17.57	1.13	45.85	100.08	0.00	0.01	0.00	0.95	0.02	0.91	0.03	1.02
7	0.14	0.49	0.06	31.60	0.89	13.98	1.15	51.55	99.91	0.00	0.00	0.00	0.94	0.03	0.76	0.03	1.20
8	0.27	3.28	0.10	33.24	0.23	17.23	0.83	44.34	99.56	0.00	0.03	0.00	0.97	0.01	0.92	0.02	1.01
9	0.23	0.89	0.04	32.17	0.65	16.68	1.86	47.41	100.01	0.00	0.01	0.00	0.93	0.02	0.88	0.05	1.07
10	0.28	1.57	0.06	33.24	0.28	17.32	1.15	45.85	99.92	0.00	0.01	0.00	0.96	0.01	0.91	0.03	1.03
11	0.36	2.43	0.04	33.70	0.28	17.51	0.81	44.44	99.56	0.00	0.02	0.00	0.97	0.01	0.92	0.02	1.00
12	0.03	0.04	0.06	10.39	4.01	18.57	21.33	46.00	100.47	0.00	0.00	0.00	0.29	0.12	0.95	0.59	1.00
13	0.04	0.08	0.03	8.06	7.33	18.41	20.25	46.44	100.62	0.00	0.00	0.00	0.22	0.21	0.94	0.56	1.01
14	0.03	0.02	0.09	8.41	4.48	18.93	23.06	45.40	100.42	0.00	0.00	0.00	0.23	0.13	0.96	0.63	0.98
15	0.06	0.27	0.04	9.42	3.51	18.37	22.97	45.91	100.72	0.00	0.00	0.00	0.26	0.10	0.93	0.63	1.00
16	0.05	0.00	0.10	9.81	7.33	18.75	18.98	45.92	100.93	0.00	0.00	0.00	0.27	0.21	0.94	0.52	0.99
17	0.06	0.13	0.06	12.06	6.61	21.77	18.01	41.89	100.58	0.00	0.00	0.00	0.33	0.19	1.08	0.48	0.89
18	0.15	0.00	0.05	27.89	0.81	7.42	2.36	61.54	100.24	0.00	0.00	0.00	0.90	0.03	0.44	0.08	1.55
19	0.17	0.00	0.03	28.05	0.94	10.17	2.82	56.84	99.08	0.00	0.00	0.00	0.88	0.03	0.58	0.09	1.40
20	0.19	0.00	0.21	27.76	0.53	8.57	2.47	58.69	98.42	0.00	0.00	0.01	0.90	0.02	0.51	0.08	1.48
21	0.26	0.00	0.22	28.42	0.88	10.44	2.56	56.77	99.58	0.00	0.00	0.01	0.89	0.03	0.60	0.08	1.39
22	0.19	0.00	0.17	26.35	1.15	9.73	4.03	57.37	98.99	0.00	0.00	0.00	0.83	0.04	0.56	0.13	1.42
23	0.08	0.02	0.09	29.01	0.72	9.67	1.87	57.78	99.24	0.00	0.00	0.00	0.91	0.02	0.56	0.06	1.43
24	0.16	0.01	0.11	28.72	1.34	13.21	1.77	52.93	98.25	0.00	0.00	0.00	0.90	0.04	0.76	0.06	1.30
25	0.28	0.00	0.10	29.21	1.38	13.15	1.77	52.66	98.83	0.00	0.00	0.00	0.90	0.04	0.74	0.05	1.27
26	0.35	0.00	0.59	31.15	0.45	16.00	1.87	48.28	98.81	0.00	0.00	0.02	0.91	0.01	0.86	0.05	1.11
27	0.39	0.00	0.94	31.69	1.39	16.41	1.64	47.66	100.13	0.01	0.00	0.02	0.89	0.04	0.84	0.05	1.05
	wt. %									apfu Σ 1 Cation							
28	0.19	0.12	0.03	0.02	34.10	18.07	0.34	47.54	100.42	0.00	0.00	0.00	0.00	0.99	0.91	0.01	1.03
29	1.56	0.00	0.06	0.01	35.28	20.89	0.14	41.86	99.91	0.02	0.00	0.00	0.00	0.99	1.02	0.00	0.88
30	0.47	0.10	0.06	0.19	33.85	19.72	0.76	44.50	99.80	0.01	0.00	0.00	0.01	0.97	0.99	0.02	0.95
31	0.41	0.06	0.05	0.57	32.87	19.64	1.83	44.86	100.37	0.01	0.00	0.00	0.02	0.93	0.97	0.05	0.95
32	0.01	0.00	0.06	0.11	46.50	53.82	0.09	0.00	100.59	0.00	0.00	0.00	0.00	0.99	2.01	0.00	0.00
33	0.00	0.14	0.09	0.05	46.15	52.65	0.08	0.00	99.19	0.00	0.00	0.00	0.00	1.00	1.98	0.00	0.00
34	0.00	0.00	0.03	0.04	46.80	53.71	0.06	0.00	100.70	0.00	0.00	0.00	0.00	1.00	1.99	0.00	0.00
35	0.00	0.00	0.01	0.10	46.43	53.17	0.06	0.00	99.78	0.00	0.00	0.00	0.00	1.00	1.99	0.00	0.00

APPENDIX 2

Representative EMPA data for bismuthinite [1-3], matildite [4-5], galena [6-9] and bournonite [10-13].

Analyzes	wt. %							Total	apfu Σ 8 Cations						
	Ag	Cu	Bi	Pb	S	Sb	As		Ag	Cu	Bi	Pb	S	Sb	As
1	0.00	0.00	81.12	0.00	18.46	0.07	0.10	99.75	0.00	0.00	7.99	0.00	11.85	0.01	0.03
2	0.00	0.00	80.32	0.00	18.52	0.42	0.13	99.39	0.00	0.00	7.90	0.00	11.88	0.07	0.03
3	0.00	0.09	79.66	0.00	17.90	0.37	0.39	98.32	0.00	0.03	7.85	0.00	11.50	0.06	0.11
	wt. %								apfu Σ 2 Cations						
4	28.15	0.00	55.05	0.46	16.78	0.00	0.00	100.44	0.99	0.00	1.00	0.01	1.99	0.00	0.00
5	28.46	0.00	55.59	0.05	16.97	0.00	0.00	101.07	1.00	0.00	1.00	0.00	2.00	0.00	0.00
	wt. %								apfu Σ 1 Cation						
6	0.00	0.05	0.00	85.91	13.47	0.11	0.00	99.56	0.00	0.00	0.00	1.00	1.00	0.00	0.00
7	0.01	0.01	0.00	85.90	13.39	0.11	0.00	99.42	0.00	0.00	0.00	1.00	1.00	0.00	0.00
8	0.00	0.02	0.00	86.27	13.40	0.18	0.00	99.87	0.00	0.00	0.00	1.00	1.00	0.00	0.00
9	0.00	0.00	0.00	86.12	13.36	0.17	0.00	99.65	0.00	0.00	0.00	1.00	1.00	0.00	0.00
	wt. %								apfu Σ 3 Cations						
10	0.00	13.37	0.00	41.43	19.45	24.35	0.00	98.60	0.00	1.03	0.00	0.98	2.98	0.98	0.00
11	0.09	13.28	0.00	42.39	19.59	24.45	0.12	99.92	0.00	1.01	0.00	0.99	2.97	0.97	0.01
12	0.06	13.38	0.00	42.00	19.62	24.54	0.05	99.65	0.00	1.03	0.00	0.99	2.98	0.98	0.00
13	0.00	13.37	0.00	42.05	19.49	24.31	0.03	99.25	0.00	1.03	0.00	0.99	2.97	0.98	0.00

*Fe – was analyzed but not detected.

APPENDIX 3

Representative EMPA data for two generation of sphalerite: sphalerite I [1-10], sphalerite II [11-20].

Analyzes	wt.%					Total	apfu Σ 1 Cation				
	Fe	Zn	Cu	Cd	S		Fe	Zn	Cu	Cd	S
1	0.16	67.63	0.00	0.49	34.23	102.51	0.00	0.99	0.00	0.00	1.02
2	0.05	67.45	0.00	0.72	34.12	102.34	0.00	0.99	0.00	0.00	1.02
3	0.15	67.52	0.09	0.25	34.01	102.02	0.00	0.99	0.00	0.00	1.02
4	0.05	67.72	0.04	0.30	33.93	104.04	0.00	0.99	0.00	0.00	1.01
5	0.10	67.57	0.12	0.28	33.91	101.98	0.00	0.99	0.00	0.00	1.01
6	0.10	66.99	0.25	0.43	34.07	101.84	0.00	0.99	0.00	0.00	1.02
7	0.22	66.59	0.04	1.50	34.23	102.58	0.00	0.99	0.00	0.01	1.03
8	0.05	67.42	0.39	0.60	34.18	102.64	0.00	0.99	0.00	0.00	1.02
9	0.14	67.35	0.10	0.36	34.41	102.36	0.00	0.99	0.00	0.00	1.03
10	0.11	67.55	0.13	0.16	34.50	102.45	0.00	0.99	0.00	0.00	1.03
11	2.53	61.74	1.31	1.46	33.87	100.91	0.04	0.92	0.02	0.01	1.03
12	2.99	63.60	0.55	0.83	34.12	102.09	0.05	0.93	0.01	0.01	1.02
13	2.91	62.26	1.37	1.14	33.95	101.63	0.05	0.91	0.02	0.01	1.01
14	2.41	63.38	1.15	0.62	34.11	101.67	0.04	0.93	0.02	0.01	1.02
15	2.91	61.48	1.78	0.74	34.25	101.16	0.05	0.91	0.03	0.01	1.03
16	2.86	62.37	0.54	0.93	34.53	101.23	0.05	0.93	0.01	0.01	1.05
17	2.03	64.26	0.65	0.68	34.85	102.50	0.01	0.94	0.02	0.01	1.04
18	1.89	63.95	1.20	0.60	34.38	102.02	0.03	0.94	0.02	0.01	1.03
19	2.10	63.96	0.76	0.59	34.19	101.6	0.04	0.94	0.01	0.01	1.02
20	4.21	61.18	0.89	0.95	34.31	101.54	0.07	0.90	0.01	0.01	1.03

*Co, Sn, Mn, In, Ge, Ga, As – were analyzed but not detected.

APPENDIX 4

Representative EMPA data for tetrahedrite group minerals: tetrahedrite-(Zn) [1-8], tetrahedrite-(Fe) [9-16], tennantite-(Zn) [17-20], argentotetrahedrite-(Fe) [21-24].

Analyses	wt.%							Total	apfu Σ 16 Cations						
	Ag	Zn	Fe	Cu	S	Sb	As		Ag	Zn	Fe	Cu	S	Sb	As
1	0.96	7.92	1.13	38.89	25.77	22.40	4.45	101.66	0.14	1.93	0.32	9.73	12.78	2.92	0.94
2	0.79	7.96	1.33	39.42	25.90	20.80	5.62	101.89	0.11	1.91	0.37	9.74	12.68	2.68	1.18
3	1.90	6.94	1.11	38.63	25.59	20.49	5.35	100.20	0.28	1.71	0.32	9.80	12.87	2.71	1.15
4	2.48	6.76	1.19	37.65	25.42	22.25	4.20	100.19	0.38	1.69	0.35	9.67	12.94	2.98	0.92
5	2.18	7.07	0.74	37.50	25.94	19.72	5.99	99.30	0.33	1.77	0.22	9.69	13.29	2.66	1.31
6	2.24	6.86	0.93	37.82	25.75	20.05	5.77	99.76	0.34	1.71	0.27	9.71	13.10	2.69	1.26
7	4.51	5.39	2.12	35.65	24.95	26.04	2.10	100.87	0.69	1.37	0.63	9.29	12.89	3.54	0.46
8	3.33	6.45	1.35	37.00	25.53	23.01	3.96	100.69	0.50	1.61	0.40	9.52	13.02	3.09	0.86
9	9.99	3.26	4.19	30.93	24.09	28.48	0.20	101.22	1.57	0.85	1.27	8.27	12.77	3.97	0.05
10	4.96	2.93	4.38	35.41	25.11	27.19	1.54	101.72	0.76	0.74	1.29	9.18	12.90	3.68	0.34
11	5.61	2.49	4.85	34.75	24.80	28.77	0.28	101.82	0.86	0.63	1.44	9.06	12.82	3.92	0.06
12	5.39	2.87	4.17	34.86	24.82	28.75	0.63	101.73	0.83	0.73	1.24	9.11	12.86	3.92	0.14
13	3.99	3.19	4.42	36.50	24.77	26.81	1.21	101.17	0.61	0.80	1.29	9.41	12.65	3.61	0.26
14	3.02	2.11	4.98	36.52	25.03	28.97	0.39	101.11	0.46	0.53	1.47	9.49	12.89	3.93	0.11
15	5.85	2.03	5.02	35.00	25.06	28.30	0.59	102.01	0.89	0.51	1.48	9.07	12.88	3.90	0.13
16	11.47	2.60	7.19	27.94	23.45	27.16	0.60	100.65	1.80	0.67	2.18	7.43	12.36	3.77	0.14
17	0.52	6.76	1.36	40.49	26.28	16.73	8.07	100.34	0.07	1.58	0.37	9.75	12.55	2.10	2.10
18	0.58	7.15	1.20	40.86	26.58	14.08	9.60	100.23	0.08	1.65	0.32	9.71	12.52	1.75	2.47
19	0.59	7.02	1.23	41.09	26.43	13.41	9.79	99.68	0.08	1.62	0.33	9.77	12.46	1.66	2.52
20	0.82	6.69	1.44	40.36	26.30	16.40	8.25	100.38	0.12	1.56	0.39	9.71	12.54	2.06	2.15
21	28.22	1.13	5.74	18.27	21.87	26.49	0.15	101.98	4.71	0.31	1.85	5.17	12.27	3.91	0.04
22	29.21	0.71	5.93	17.75	21.97	26.28	0.08	102.09	4.90	0.20	1.92	5.05	12.39	3.90	0.02
23	26.47	1.33	5.76	19.66	22.18	26.63	0.12	102.29	4.37	0.36	1.84	5.50	12.31	3.89	0.03
24	29.05	0.57	6.03	17.86	21.95	26.46	0.18	102.31	4.85	0.16	1.94	5.06	12.34	3.92	0.04

*Hg, Mn, Bi, Pb, Ni – were analyzed but not detected.