Supplementary Table 1 Chemical composition of samples of different geological formations

Borehole/depth (m)	Sample type	SiO_2 (wt%)	TiO_2 (wt%)	Al_2O_3 (wt%)	Fe_2O_3 (wt%)	MnO (wt%)	MgO (wt%)	CaO (wt%)	Na_2O (wt%)	K_2O (wt%)	P_2O_5 (wt%)	S (wt%)	Zn (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	LOI (wt%)
Borehole B2																
0.1-0.3	Oxidized tailings	59.4	0.46	14.4	2.92	0.12	0.55	1.57	0.82	2.68	0.10	0.32	317	464	34	5.77
2.5-2.7	Tailings	58.7	0.84	16.3	10.1	0.10	3.06	2.19	1.56	1.99	0.16	2.89	4,550	3,270	31	6.71
5.5-5.7	Tailings terrace sediment	55.5	1.04	17.2	8.10	0.15	2.62	3.02	2.42	2.34	0.11	0.95	1,670	607	22	2.97
7.8-8.0	Terrace deposit	65.3	0.53	19.7	4.65	0.13	0.82	1.18	1.5	2.29	0.16	0.33	177	49	22	7.78
9.8-10	Lapilli tuff (weathering)	52.0	0.79	15.3	7.81	0.09	1.18	3.61	2.8	0.97	0.07	0.06	162	32	19	2.46
Borehole B3																
0.2-0.4	Oxidized tailings	62.5	0.51	10.3	5.49	0.09	0.76	1.45	1.07	2.34	0.11	0.66	362	271	25	4.03
2.0-2.2	Taillings	59.5	0.61	12.2	14.2	0.13	4.22	3.99	2.05	1.02	0.16	5.32	8,520	3,190	32	6.33
3.0-3.2	Tailings	51.3	0.65	11.9	19.2	0.13	5.72	3.85	2.04	0.81	0.16	4.95	6,910	2,860	30	6.42
5.0-5.2	Tailings	50.0	0.65	11.1	19.4	0.09	5.49	3.13	1.34	0.82	0.15	4.94	7,580	2,250	22	6.5
7.0-7.2	Tailings	49.5	0.58	9.00	20	0.07	4.95	1.73	0.69	0.81	0.12	5.39	19,400	2,510	25	6.12
8.0-8.2	Tailings	71.9	0.42	8.8	19.8	0.10	3.29	3.41	1.22	0.72	0.10	3.45	6,280	1,990	10	4.22
9.0-9.2	Lapilli tuff	70.7	0.57	14.6	18.9	0.07	4.33	4.57	3.03	0.37	0.08	0.05	85	15	16	2.35
Borehole B4																
0.1-0.3	Soil covering	63.6	0.48	20.1	5.16	0.06	0.45	0.56	1.2	2.75	0.02	0.67	94	160	25	5.86
0.5-0.7	Tailings	61.2	1.04	11.7	5.47	0.12	1.07	2.02	0.67	2.01	0.15	3.76	3,800	4,190	48	6.85
1.0-1.2	Tailings	49.0	0.56	11.9	17.8	0.17	4.73	2.79	0.74	1.05	0.16	4.59	6,380	1,350	47	5.83
2.5-2.7	Tailings	45.8	0.52	12.6	20.6	0.15	5.08	3.37	1.13	0.91	0.16	5.49	6,720	2,170	47	6.8
4.0-4.2	Tailings	44.2	0.59	13.7	20.5	0.15	6.52	3.47	1.29	0.86	0.18	4.57	4,870	3,470	48	3.44
5.5-5.7	Lapilli tuff	46.4	0.65	16.5	19.1	0.1	6.44	4.04	2.77	1.19	0.08	0.74	165	58	20	4.47
Borehole B5																
0.6-0.8	Tailings	54.5	0.69	13.3	14.2	0.10	4.02	1.27	0.49	1.06	0.12	2.47	2,860	1,650	19	7.33
1.8-2.0	Tailings	49.7	0.61.	12.6	17.6	0.10	3.96	2.34	1.01	1.10	0.18	4.8	5,390	1,760	38	7.56
3.3-3.5	Tailings	46.9	0.54	13.2	20.1	0.10	5.29	3.78	1.48	1.03	0.20	4.22	5,440	1,940	55	5.93
4.0-4.2	Lapilli tuff weathering	55.7	0.69	14.4	18.5	0.10	5.45	4.14	2.16	1.06	0.07	0.10	73	13	18	3.23
6.0-6.2	Lapilli tuff weathering	73.4	0.52	14.1	5.27	0.10	6.45	4.31	2.81	2.76	0.67	0.10	67	11	17	3.39

※Detection limits of major elements are 0.01 - 0.1 wt% whereas those of minor elements are 1 mg/kg.

Supplementary Table 2 Mineral constituents of samples of different geological formations

Borehole/Depth (m)	Type of sample	Mineralogical composition
Borehole B2		
0.1-0.3	Oxidized tailings	Quartz, albite, chlorite
2.5-2.7	Tailings	Quartz, albite, chlorite, pyrite
5.5-5.7	Tailings terrace sediment	Quartz, albite, clinochlore
7.8-8.0	Terrace deposit	Quartz, albite, chlorite
9.8-10	Lapilli tuff (weathering)	Quartz, anorthite
Borehole B3		
0.2-0.4	Oxidized tailings	Quartz, anorthite, jianshuiite
2.0-2.2	Tailings	Quartz, albite, clinochlore, ferroactinolite, pyrite
3.0-3.2	Tailings	Quartz, albite, chlorite, pyrite
5.0-5.2	Tailings	Quartz, anorthite, chlorite
7.0-7.2	Tailings	Quartz, anorthite, chamosite, nantokite, pyrite
8.0-8.2	Tailings	Quartz, albite, chlorite
9.0-9.2	Lapilli tuff	Quartz, anorthite
Borehole B4		
0.1-0.3	Soil covering	Quartz, anorthite, halloysite
0.5-0.7	Tailings	Quartz, anorthite, chlorite, pyrite
1.0-1.2	Tailings	Quartz, clinochlore, pyrite, nantokite
2.5-2.7	Tailings	Quartz,chlorite, magnesioriebeckite, pyrite
4.0-4.2	Tailings	Quartz, albite, chlorite, pyrite
5.5-5.7	Lapilli tuff	Quartz, albite, anorthite, chlorite, sanidine
Borehole B5		
0.6-0.8	Tailings	Quartz, albite, clinochlore, ferroactinolite, pyrite
1.8-2.0	Tailings	Quartz, chlorite, sphalerite, pyrite
3.3-3.5	Tailings	Quartz, albite, clinochlore, ferroactinolite, pyrite
4.0-4.2	Lapilli tuff weathering	Quartz, albite, anorthite
6.0-6.2	Lapilli tuff weathering	Quartz, anorthite