Supplementary Table 1. Risk ranking criteria for final acid rock drainage index (ARDI) values.

ARDI score	Classification
50 to 41	Extremely acid forming (EAF)
40 to 31	Acid forming (AF)
30 to 21	Potentially acid forming (PAF)
20 to 11	Non-acid forming (NAF)
10 to 0	Non-acid forming (NAF) or potential neutralising capacity (PNC)
−1 to −10	Acid neutralising capacity (ANC)

Supplementary Table 2. Geoenvironmental standard values used in the HyLogger geoenvironmental index calculation.

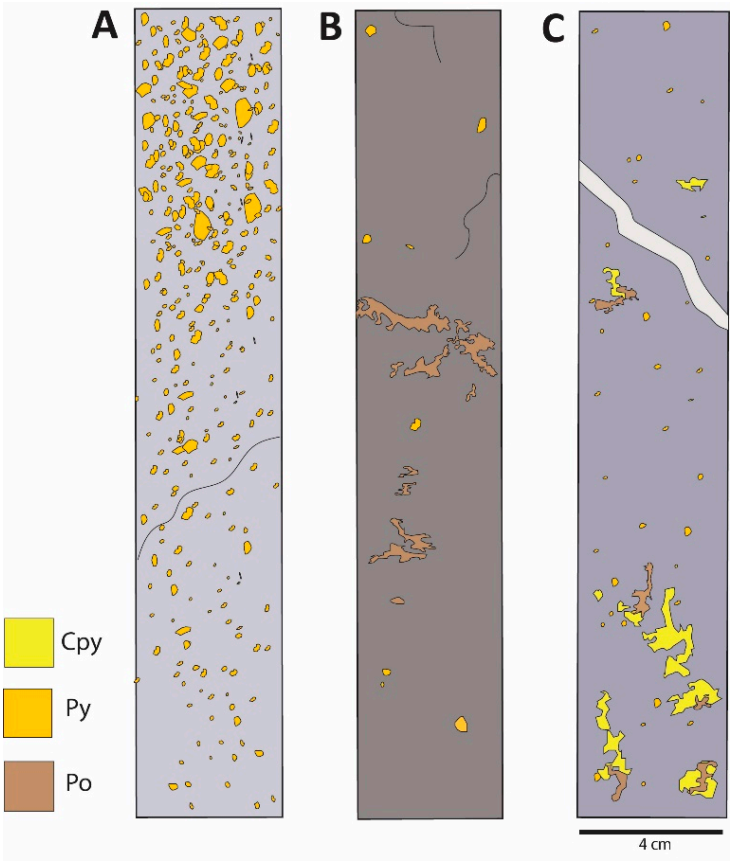
Mineral	Geoenvironmental Standard value	Neutralising Potential (Jambor et al., 2007)	Relative reactivity (Sverdrup, 1990)
Amphibole	1.2	3	0.4
Apophyllite	0		0.4
Aspectral	0	0	0
Biotite	0	0	0
Carbonate	1000	1000	1
Chlorite	2.4	6	0.4
Epidote	0.4	1	0.4
Gypsum	8	8	1
Kaolinite	0.16	8	0.02
Laumontite	0.032	8	0.004
Magnetite	0.04	2	0.02
Montmorillonite	0	0	0.02
Nontronite	0	0	0.02
Phlogopite	0	0	0.04
Prehnite	0.12	6	0.02
Saponite	0.4	1	0.4
Sericite	0.01	1	0.01
Quartz	0	0	0.004
Tourmaline	0	0	0.04
Vermiculite	0	0	0
Muscovite	0.01	1	0.01
Phengite	0.01	1	0.01
Diaspore	0	0	0
Ankerite	970	970	1
Siderite	864	864	1
Dolomite	1086	1086	1
Calcite	1000	1000	1
Albite	0.01	1	0.01

Supplementary Table 3. Geochemical data summary for W2 and OZ1 with ALS Method Codes given (n = 64).

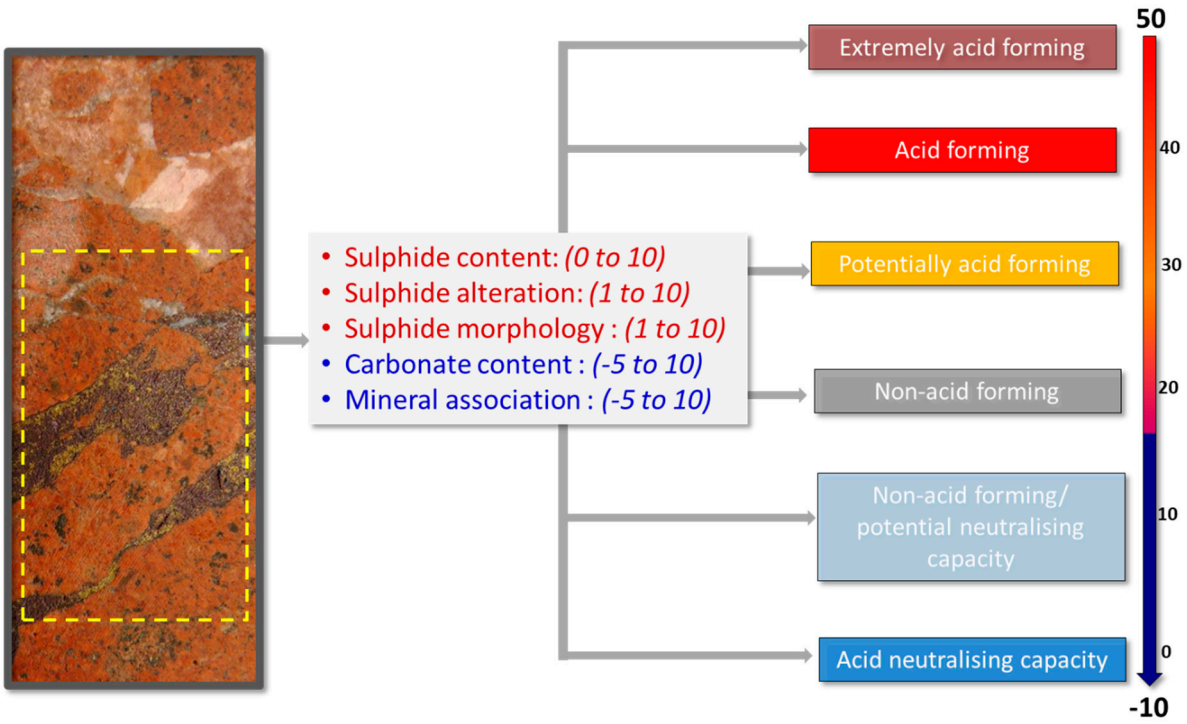
Method code	Element	Unit	Max	Min	Mean	Standard Deviation
ME-XRF26	Al_2O_3	wt. %	16.8	10.0	13.8	1.9
ME-XRF26	BaO	wt. %	0.3	0.0	0.1	0.0
ME-XRF26	CaO	wt. %	7.1	0.1	3.4	1.7
ME-XRF26	Cr_2O_3	wt. %	0.0	0.0	0.0	0.0

ME-XRF26	Fe_2O_3	wt. %	9.6	1.4	4.6	2.2
ME-XRF26	K_2O	wt. %	3.9	0.7	2.1	0.8
ME-XRF26	MgO	wt. %	5.4	0.3	1.6	1.1
ME-XRF26	MnO	wt. %	0.2	0.0	0.1	0.0
ME-XRF26	Na_2O	wt. %	4.1	1.0	2.9	0.7
ME-XRF26	P_2O_5	wt. %	0.4	0.0	0.1	0.1
ME-XRF26	SiO_2	wt. %	79.6	54.2	69.2	6.4
ME-XRF26	SrO	wt. %	0.1	0.0	0.0	0.0
ME-XRF26	TiO_2	wt. %	1.1	0.1	0.4	0.2
ME-GRA05	*LOI*		*2.4*	*0.5*	*1.1*	*0.4*
ME-MS81	Ba	ppm	2820.0	178.5	596.4	375.4
ME-MS81	Ce	ppm	1245.0	21.0	52.5	150.7
ME-MS81	Cr	ppm	210.0	10.0	33.5	38.0
ME-MS81	Cs	ppm	17.3	1.3	6.8	4.3
ME-MS81	Dy	ppm	34.0	1.0	3.1	4.1
ME-MS81	Er	ppm	10.2	0.7	1.8	1.3
ME-MS81	Eu	ppm	8.0	0.5	0.9	0.9
ME-MS81	Ga	ppm	26.2	15.1	19.0	2.2
ME-MS81	Gd	ppm	66.1	1.3	3.8	7.9
ME-MS81	Hf	ppm	8.3	1.9	3.2	1.1
ME-MS81	Ho	ppm	4.9	0.2	0.6	0.6
ME-MS81	La	ppm	676.0	9.2	27.1	82.0
ME-MS81	Lu	ppm	0.7	0.1	0.3	0.1
ME-MS81	Nb	ppm	13.7	3.7	6.2	2.3
ME-MS81	Nd	ppm	524.0	9.4	23.5	63.3
ME-MS81	Pr	ppm	139.5	2.5	6.1	16.9
ME-MS81	Rb	ppm	169.0	26.3	74.9	25.5
ME-MS81	Sm	ppm	97.5	1.6	4.6	11.7
ME-MS81	Sn	ppm	19.0	1.0	3.2	2.8
ME-MS81	Sr	ppm	698.0	25.3	340.1	160.6
ME-MS81	Ta	ppm	1.4	0.3	0.6	0.2
ME-MS81	Tb	ppm	7.7	0.2	0.5	0.9
ME-MS81	Th	ppm	11.5	1.8	4.8	2.1
ME-MS81	Tm	ppm	1.0	0.1	0.3	0.2
ME-MS81	U	ppm	6.1	1.1	2.5	1.1
ME-MS81	V	ppm	170.0	5.0	75.1	42.9
ME-MS81	W	ppm	54.0	1.0	4.8	8.0
ME-MS81	Y	ppm	160.5	6.0	17.4	19.3
ME-MS81	Yb	ppm	4.8	0.6	1.7	0.9
ME-MS81	Zr	ppm	351.0	64.0	117.1	46.1
ME-4ACD81	Ag	ppm	17.1	0.7	2.8	2.7
ME-4ACD81	Cd	ppm	26.4	0.5	2.5	4.6
ME-4ACD81	Co	ppm	103.0	1.0	8.6	13.0
ME-4ACD81	Cu	ppm	8890.0	27.0	1645.9	1849.5
ME-4ACD81	Li	ppm	50.0	10.0	18.5	8.0
ME-4ACD81	Mo	ppm	165.0	1.0	20.6	33.3
ME-4ACD81	Ni	ppm	75.0	1.0	9.3	13.2

ME-4ACD81	Pb	ppm	888.0	7.0	86.3	153.5
ME-4ACD81	Sc	ppm	19.0	3.0	9.4	4.8
ME-4ACD81	Zn	ppm	4290.0	8.0	343.7	631.3
ME-MS42	As	ppm	211.0	3.6	25.0	37.0
ME-MS42	Bi	ppm	17.0	0.1	1.6	2.6
ME-MS42	Hg	ppm	0.1	0.0	0.0	0.0
ME-MS42	In	ppm	1.3	0.0	0.1	0.2
ME-MS42	Re	ppm	0.1	0.0	0.0	0.0
ME-MS42	Sb	ppm	37.5	0.3	2.1	5.2
ME-MS42	Sc	ppm	10.6	1.0	4.2	2.0
ME-MS42	Se	ppm	5.3	0.4	1.6	1.2
ME-MS42	Te	ppm	2.9	0.0	0.5	0.5
ME-MS42	Tl	ppm	1.6	0.1	0.6	0.3
S-IR08	S	ppm	2.4	0.0	0.4	0.4
C-IR07	C	ppm	0.2	0.0	0.0	0.0
ME-ICP41	As	ppm	538.0	430.0	484.0	76.4



Supplementary Figure 1. Example of interval sulphide assessment. (**A**) interval contains Py only—Py = 1, Cpy = 0, Po = 0; (**B**) Both Po and Py are present, however Po is more abundant affording a higher overall value to be given—Py = 0.2, Cpy = 0, Po = 0.8; (**C**) All three primary sulfide phases are present within the interval such that Cpy > Po > Py—Py = 0.2, Cpy = 0.5, Po = 0.3. Abbreviations: Py, Pyrite; Cpy, Chalcopyrite; Po, Pyrrhotite. Figure reproduced from Cornelius et al. [28].



Supplementary Figure 2. Example of performing the acid rock drainage index (ARDI) on drill core. The assessment takes place on an individual sulphide mineral group identified in an area equivalent to a pocket grain-size chart (e.g., 8.5 cm × 5.5 cm). The assessment is performed over the general area and not on individual grains. Scores given for each parameter are totaled to give the final ARDI value. The ARDI score is then multiplied by the abundance score given for that mineral across the interval. ARDI scores for each sulphide are totaled to give the final value for the interval.