Model 28	Felsic extrusive VAMS Cu-Pb-Zn-Ag-Au
Alternative Model Name	VAMS Kuroko (including Archaean deposits)
Commodities	Cu, Pb, Zn, Ag, Au (some with Sn and In)
% Global Production	~ 25%
% Australian Production	14% of total Zn production and resources; probably similar for other metals, except Au
% Australian Global Resources	4% Cu; 13% Pb+Zn
World Class Deposit Size	>100 Mt at 7% Zn or 2.5% Cu
World Class Deposit Examples	Kidd Creek, Brunswick No 12, Neves Corvo, Rio Tinto, Flin Flon, Mt Lyell Field.
Geological Setting	Extensional volcanic basins, both back-arc and ensialic
Age	Palaeoarchaean to Recent. Most prolific periods: Late Archaean (2750-2700 Ma); Early Proterozoic (1900-1800 Ma); Early Phanerozoic (500-450 Ma); Late Phanerozoic (390-250 Ma and 30-0 Ma)
Components:	
Source	Metals – mainly leaching of rocks in footwall; probably magmatic-hydrothermal metals in some systems Fluids – seawater, evolved by reaction with volcanic-sedimentary host sequences; possible magmatic contributions in some districts Heat – sub-volcanic intrusions in small to medium-sized districts; the heat source may be more regional in world-class districts
Transport/Pathway	Syn-volcanic faults; convection in porous medium driven by subvolcanic felsic intrusions (may not apply to world-class districts!)
Trap	Interaction with seawater at or just below the seawater-rock interface
Other	Water depth >700 m. Rapid burial after mineralisation
Critical Elements	• Overall rifting environment with active volcanism (1) • Felsic volcanism (1) • High heat flow produced by sub-volcanic intrusions or a regional-scale zone of high heat flow (1) • Presence of siliciclastic rocks in the host stratigraphic successions favours large deposits (2) • Stratigraphic positions involving either a change in the character of volcanism or a hiatus in volcanism (1) • Syn-volcanic faults that localise upflow (2) • Interaction with seawater at or just below ocean floor (1). • Water depth > 700 m (2) • Rapid burial to allow preservation (2)
Other Comments	Most commonly associated with felsic volcanic rocks, even in volcanic piles dominated by basaltic rocks. In most cases the deposits form during hiatus during sedimentation. In many small to medium-production districts, a sub-volcanic granitoid is present; in high-production districts, such granitoids have not been recognised
Key References	Barrie, C.T. & Hannington, M.D., editors., 1999. Volcanic-associated massive sulfide deposits: processes and examples in modern and ancient settings.

	Reviews in Economic Geology, 8 (1999). Large, R.R., 1992. Australian volcanic-hosted massive sulfide deposits: features, styles, and genetic models. Economic Geology 87, 471-510. Franklin, J.M., Sangster, D.M. & Lydon, J.W., 1981. Volcanic-associated massive sulfide deposits. Economic Geology 75th Anniversary Volume, 485-627.