Table S1. Summary and comparison of principal characteristics of SEDEX, MVT, Irish-type and the Wusihe Pb-Zn deposit.

Features	Sedimentary-exhalative (SEDEX)	Mississippi Valley-Type (MVT)	Irish-Type	The Wusihe district
Location	Worldwide. Mainly Canada, Australia, Germany, Alaska	Worldwide. Mainly central United States, other occurrences in Canada, Iran, China, Mongolia, and Russia.	Irish Midlands	South China
Examples	Mt Isa, Broken Hill, Red Dog, MacArthur River, Sullivan	Ozark, Viburnum Trend, Tri-State District, Pine Point etc.	Navan, Galmoy, Lisheen, Silvermines, Tynagh	Wusihe
Tonnage	Variable 2-130 Mt	Extremely variable	6.9-110Mt @ 5-12.8% Pb+Zn	~5.4Mt @ 10.6% Pb+Zn
Geological setting	Extensional first and second-order basins	Carbonate platform sequences and thrust belts, rare occurrences in extensional basins	Carbonate ramp and extensional basins on extending continental margin	The composite tectonic setting, i.e. the Xiaojiang thrust-fold, the Longmenshan intracontinental Orogenic Belt
Tectonic/metamorphic overprint	Low-grade metamorphism may produce porphyroblastic pyrites	No examples recognized	Common post-ore thrusting and wrench faulting	No examples recognized
Associated igneous activity	No direct association with igneous activity, but tuffs related to synchronous distal volcanism may be present	Not associated with igneous activity	Close spatial and temporal association with volcanic activity in Limerick province	Not associated with igneous activity
Geological age	Middle-Proterozoic to present, rare occurrences in Archean	4/5 of deposits are Phanerozoic, 1/5 are Precambrian	Early Carboniferous	Late Silurian - Early Devonian
Ore-forming age	Syngenetic - early diagenetic	Epigenetic	Mostly during diagenesis, minor syngenetic component	Epigenetic
Structural controls	Syn-sedimentary faults controlling sub-basins and associated fractures and breccias	Normal, trans-tensional, and wrench faults and associated fractures and breccias	Syn-sedimentary faults controlling sub-basins and associated fractures and breccias	Reverse faults and folds

Ore-body morphology and controls	Single or multiple wedge- or lens-shaped, or sheeted/stratiform morphology	Commonly discordant on a deposit scale but strata bound on a regional scale	Regionally stratiform lenses, replacement of soft-sediment textures	~50km long ore-bearing strata within the Wusihe mining district
Mineralogy	Sp, Gn and Py (±Pyr) and common Brt	Sp, Gn, Py, Mar, minor Dol, Cal, Fl (rare), Brt (minor to absent)	Sp (low Fe), Gn, Py, Mar, minor Cpy, Dol, Cal, Q, and Fl (extremely rare), Brt (common)	Sp, Py, Gn and Q, Dol, Cal, Bit, Kf
Texture & Structure	Bedding-parallel, banded, and fine-grained textures with minor coarser-grained brecciated, veined, fragmental, or chaotic textures	Coarse- to fine-grained, colloform, massive to disseminated. Replacement and open - space filling	Dominated by massive sulfide but highly variable and complex textures. Mostly replacement, common veins and locally open-space filling	Coarse- to fine-grained, colloform, highly variable and complex textures: lamellar, disseminated, stockwork, brecciated, veined, massive. Replacement and open - space filling
Ore-forming fluid	Low to high temperature (70–300°C) infiltrated or connate, variably evaporated seawater.	Mostly low temperature (90–200°C) connate bittern brines or evaporite dissolution brines	Low to moderate temperature (70-280°C) infiltrated partially evaporated seawater	Low-medium temperature (120-260°C)
Trace metal	Cu, As, Cd, Sb, Tl, Hg, Se, Bi, Ge, Ni	Cu, Co, Ni, Ag, Sb, Cd, Ge, Ga, In	Cu, Cd, Ag, As, Ni, Co	Ag
S isotope	Predominantly positive; reduced seawater sulfate (BSR or TSR) in host rock or second fluid	Predominantly positive; reduced seawater sulfate (TSR) in host rocks or second fluid	Predominantly negative; reduced seawater sulfate (BSR) in second fluid	Predominantly positive; reduced seawater sulfate (TSR and BSR) in host rocks or second fluid
Pb isotope	Within-deposit homogeneity; mostly relatively unradiogenic crustal Pb	Within-deposit heterogeneity; crustal-derived, highly radiogenic in the United States and Canada	Within-deposit homogeneity; regionally variable, relatively unradiogenic crustal Pb	Within-deposit homogeneity; Crustal-derived
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