FLUIDS IN THE CSA Cu-Pb-Zn DEPOSIT, NSW,AUSTRALIA

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CSA is a Cobar-type deposit. Cobar-type Au-Cu-Ag-Pb-Zn massive-sulfide ores occupy epigenetic systems that have dip,strike and width extents of 1km, 300mand 100m respectively. The type-model involves structurally-controlled emplacement during basin-inversion tectonism spanning late diagenesis and regional metamorphism. Sulfides deposited from two fluid sources during the variable and progressive overprinting of saline, CH4-rich, basinal fluids by higher temperature, low-salinity, H2O-CO2 bearing, basement-derived, metamorphic(?) fluids; or simply by these fluids mixing. Ag-Pb-Zn mineralization is said to be basin-dominated; Cu-Au is basement-dominated.

Five categories of secondary fluid inclusion (Types IA, IB, II, III, IVA) exist in quartz coexisting with sulfides in CSA ore. Primary fluid inclusions (Type IVB) occur in quartz crystals in vugs in syn- or post-cleavage tension gashes cross-cutting ore. In formation order (oldest first): Types IA (along microfractures in strained quartz) and IB (along grain boundaries in recrystallized quartz) are decrepitated and empty or have become infilled by later CH4-rich fluid; Type II monophase inclusions are CH4 liquid (Th(CH4) -90.1 to -84.7oC); Type III H2O+CH4 inclusions comprise CH4 liquid immiscible within H2O (Th(CH4) -128.6 to -86.1oC, Tm(ice) -2.0 to -0.1oC, Th(total) 218 to 226oC); Type IVA are hydrosaline with traces of CH4 gas (Tm(ice) -2.0 to -0.6oC, Th(to liquid) 113 to 305oC); and Type IVB growth-zone primaries are hydrosaline (Tm(ice) -1.5 to -0.9oC, Th(to liquid) 165.8 to 185.6oC). All of the inclusion-types are syn- to post-metamorphic; none provides direct evidence of late diagenetic connate fluid; none contain detectable CO2; the original contents of Types IA and IB were lost through decrepitation. The populations suggest post-decrepitative outflow of CH4-rich fluids during the syn- to post-metamorphic periods, coupled with progressive involvement of low-salinity, H2O-rich meteoric(?) fluid. The results are indirectly consistent with basinal CH4 liquids being involved with ore formation, but provide no insight on a higher temperature H2O-CO2 basement-sourced fluid.