Involvement of variably-sourced fluids during the formation and later overprinting of Paleoproterozoic Au-Cu mineralization: Insights gained from a fluid inclusion assemblage approach

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Abstract

An-Cu mineralized quartz veins of the Reef Deposit, Wisconsin, USA, originally formed prior to or early in the Paleoproterozoic Precambrian era or continued into the Mesozoic Era, as evidenced by fluid inclusions in VMS deposits, or in an orogeny setting. Nearly 400 my have elapsed since thermal fluids associated with a continental scale metamorphic event evolved and circulated within the veins. And still later, during the Paleozoic, underplating and subsequent erosion of the ore and other metals occurred in response to circulation of fluids associated with Mississippi Valley-type deposits formed everywhere in supercontinent poles. Fluid contents of the formations of the Reef Deposit and later overprinting over a 1.5 b.y. time span are examined using the Fluid Inclusion Assemblage Project on faults interpreted on individual merit, each offering individual stories to aid in our understanding of the protracted development of the Reef Deposit. Prominently primary fluid inclusions to Au and Cu-bearing quartz-carbonate veins that formed during the Precambrian, exist along H2O-CO2-NaCl-H4SiO4 compositions based on microthermometry and laser Raman composition analysis. Primary inclusions of late hydrothermal fluids are examined using fluid inclusion trails, secondary fluid inclusion trails extending outward from pyrite and terminating in quartz from the protracted development of the Reef Deposit.

Imagery:

Distinctive assemblages are examined on individual merit, each offering individual stories to aid in our understanding of the protracted development of the Reef Deposit.

References

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~1830 Ma

Methane bearing inclusions associated with ~1830 Ma vein formation (VMS or Orogenic Au?)

~1470 Ma

Amphibolite grade regional deformation identified by neomorphic inclusions

~1700 Ma

Methane bearing high temperature inclusions associated with ~1470 Ma magmatism

Low temperature H2O-NaCl inclusions associated with late MVT overprint

~270 Ma

Fluid Inclusions

Accidental Trapping, Relict/Neonate clusters, Secondary Trails

Veins

Cathodoluminescence