

## Constraining the Sources of Ore Metals in the Mississippi Valley-type Deposits in Tennessee using Pb Isotopes

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In Central and East Tennessee, economically significant Mississippi Valley-type zinc deposits occur in the Early Ordovician carbonates of the Knox Group [1]. Although they share the same host rocks, evidence suggests that the ores did not form from the same mineralizing fluids. The deposits of Central Tennessee are located in the foreland area of the Alleghenian orogenic belt, along the axis of the Cincinnati Arch, have no surface expression, and contain red-brown to black colored sphalerite that is enriched in the strategic metals Ga and Ge [2]. In contrast, the East Tennessee deposits are hosted in the overthrust belt of the orogen and exposed at the surface, the sphalerite has a pale yellow color [3] and shows no enrichment in Ga or Ge.

Nu Plasma MC-ICP-MS Pb isotopic analyses on sulfides and whole-rocks were conducted and the metal sources evaluated. As previously suggested [4], it appears that thick shales of the Appalachian Basin have been the source of ore fluids, and ultimately of ore metals, that formed the East Tennessee deposits. However, the Pb isotopic compositions of sphalerites from the Central Tennessee deposits suggest that a more radiogenic crustal Pb source from the southern part of the Illinois Basin may represent the source of Pb isotopic signature of the ores.

[1] Briskey *et al* (1986) *Ir. Assoc. Econ. Geol.* [2] Bonnet (2013) *SGA Biennial Meeting* **4**, 1691-1693. [3] Kyle (1976) *Econ. Geol.* **71**, 892-903. [4] Hoagland (1971) *Econ. Geol.* **66**, 805-810.