

Paper No. 152-19 Presentation Time: 1:30 PM-5:30 PM *DEVELOPING A SPATIAL AND TEMPORAL MODEL OF CARBONATE VEIN CHARACTERIZATION IN AND AROUND CARLIN-TYPE GOLD DEPOSITS*

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Carlin-type deposits have an alteration pattern of decarbonatization, silicification, and argillization. Decarbonatization is the most extensive of the alteration. Little is known about the destination of the carbonates that are leached from the limestone although there appears to be a halo of carbonate veins around many deposits. On a deposit to regional scale there is a lack of clear and consistent crosscutting relationships in the multiple-stage carbonate veins in and around Carlin-type deposits. In addition, little has been done to separate vein generations based on vein composition and geochemistry. The research reported here focuses on geochemical methods to help determine carbonate vein paragenesis. Carbonate staining was used in the field, followed by trace element and isotope geochemistry to chemically differentiate the carbonate veins. All of these techniques demonstrate zoning with respect to the geology. Iron is related to the wallrock type, base metals (Zn and Ni) are present as halos above the deposits, and some rare earth elements (Sm and Eu) also show complex zoning patterns. The zoning data suggest up to as many as five phases or events are recognizable, not all of which are necessarily related to the formation of the deposits. These data provide important information about the evolution of the hydrothermal fluids as well as provide a potential vectoring tool for exploration.

[2002 Denver Annual Meeting \(October 27-30, 2002\)](#)

Session No. 152--Booth# 19

[Economic Geology \(Posters\)](#)

Colorado Convention Center: Exhibit Hall

1:30 PM-5:30 PM, Tuesday, October 29, 2002