Economic Geology, v. 100, pp. 537–546

Uranium Deposits of the Mount Isa Region and Their Relationship to Deformation, Metamorphism, and Copper Deposition

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Abstract

The Mount Isa region contains over 20 uranium deposits, few of which contain economic concentrations of uranium. They are thought to be significant in the exploration for new copper deposits, based on the model that the uranium deposits are located in the pathways of oxidized hydrothermal fluids that formed the postmetamorphic Mount Isa copper orebodies.

There are two uranium deposit types, both hosted in volcanosedimentary rocks. We suggest that they represent one mineralization event but different metamorphic histories. Examples in the eastern low-grade metamorphic zone are dominated by a brannerite-anatase-apatite assemblage and are low in uranium. The examples in the western high-grade metamorphic zone are characterized by uraninite and titanite with higher uranium concentrations. The chemical association of U, Ti, and Ca is consistent for all deposits; however, phosphate is only important at low metamorphic grade.

The most likely mechanism of formation in the lower metamorphic grade Anderson's Lode example is the complete replacement of chlorite in the sedimentary host-rock matrix by the mineralizing assemblage. In this model, chlorite acted as a reductant, allowing the deposition of uranium from an oxidized fluid. This mechanism of uranium deposition is similar to that proposed for unconformity-type uranium deposits. We conclude that these uranium deposits are metamorphosed equivalents of Proterozoic unconformity-type uranium deposits found elsewhere in northern Australia.

At Anderson's Lode, brannerite and apatite were concentrated in veinlets by pressure dissolution after the deposition of the original assemblage. These pressure dissolution seams are cut by premetamorphic quartz-chlorite veins. Examples at higher metamorphic grade have textures that suggest uranium deposition was pre- to synmetamorphic at the latest. This precludes any genetic or temporal connection between the uranium deposits and the postmetamorphic Mount Isa copper deposit.

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0361-0128/01/3508/537-10 $6.00