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Sediment-hosted Copper in the US: Learnings From Structural Controls on Deposits in the Central African Copperbelt and Chu Sarysu Basin

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Copper production in the United States is dominantly from porphyry copper deposits. However, significant copper is also contained in sediment-hosted copper deposits in a number of sedimentary basins. The most significant of these are the Revett-type sediment-hosted stratabound copper-silver deposits in the Belt-Purcell Basin in Montana and Idaho and in reduced facies type sediment-hosted copper deposits in the Midcontinent Rift System in the Lake Superior region.

The Belt-Purcell Basin and Midcontinent Rift deposits share similarities with sediment-hosted copper deposits in the Central African Copperbelt and the Chu-Sarysu Basin in Kazakhstan where the distribution of copper mineralization is strongly influenced by basin architecture. Basin architecture is a product of syndepositional tectonics influencing deep basin faults, structural highs, basin margin growth faults, sediment thickness variations, facies distribution and the formation of sub-basin depocenters. Although stratabound, these deposits are also structurally controlled with interconnected faults, fractures and flexures playing a critical role in fluid flow and localization of mineralization in stratigraphic and structural traps.

Recent studies and exploration in the Central African Copperbelt have advanced our understanding of the structural controls of sediment-hosted copper deposits, particularly relating to basin and sub-basin architecture. On a local scale, syn-sedimentary faulting at the Kamo-a-Kakula and Fishtie deposits has directly influenced copper grade distribution. In the Chu-Sarysu Basin, features such as the density of faulting and development of monoclinial flexures have strongly influenced grade distribution.

Sediment-hosted copper deposits in the US are considered in the light of these observations and conclusions drawn on prospectivity and implications for exploration.