Sediment-hosted copper deposits in Michigan: A new dawn at Copperwood

Denis Miville-Deschenes, Highland Copper Company Inc., Quebec City, Canada

The Copperwood sediment-hosted copper deposit is located in Gogebic County in the Upper Peninsula of Michigan, USA within the Porcupine Mountains copper district and about 35 km west of the former White Pine mine. Copperwood is a project at the final feasibility stage, with the results of the updated feasibility expected in Q2/2018. Copperwood was discovered in 1956 and boasts the highest-grade of all known sediment-hosted copper deposits in the Upper Peninsula. It is geologically very similar to the White Pine deposit.

The Copperwood deposit is located on the southwest limb of the Western Syncline and is covered by approximately 30 m of unconsolidated glacial sediments. It is characterized by its geologic simplicity and consistency of mineralization. The ore sequence is a sheet-like, tabular body that is 2.3 m thick on average and dips gently to the north; mineralization occurs exclusively as fine-grained chalcocite, a copper mineral that contains 79.8% copper. Recently a new NI 43-101 compliant resource was estimated at 42.5 Mt grading an average of 1.59% copper and 3.9 g/t silver containing 1.5 Blbs of copper and 5.4 Moz of silver in the measured and indicated resource category. The deposit is amenable to room-and-pillar and continuous mining.

Mineralization in the deposit is characterised by two separate copper-bearing sequences, the Lower Copper Bearing Sequence (“LCBS”: Domino, Red Massive, and Gray Laminated beds), and the Upper Copper Bearing Sequence (“UCBS”). The bulk of the mineralization is in the LCBS which has an average thickness of 2.3 m. The Domino horizon is characterized by dark-gray to black, thinly-laminated shales and siltstones, averages 1.18 m thick and typically hosts copper grades above 2%. The thickness of this unit drives the deposit's economic viability. The Red Massive is a massive siltstone that averages 0.34 m thick with copper grades commonly below 0.4%. The Gray Laminated is comprised of gray to red-gray laminated siltstones that average 1.1 m thick with copper grades typically above 1%.

Chalcocite is the only ore mineral at Copperwood. It is very fine-grained and forms continuous seams parallel to laminations but is also disseminated. Chalcocite formed as a replacement of pre-existing pyrite at low temperatures.

There are other sediment-hosted copper deposits in the Western Syncline that are contiguous to, overlie, or are within 1.5 km of the Copperwood deposit and share the same geology.