

BTH 15 Ross, Andrew M.

GOLD ENRICHMENT IN THE PRECAMBRIAN AGE GOSSAN OF THE FLAMBEAU VMS DEPOSIT, RUSK COUNTY, WISCONSIN

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The Flambeau ore deposit, located in Rusk County, Wisconsin, is a Precambrian, supergene enriched, volcanogenic massive sulfide orebody, capped by a well defined gossan which overlies supergene enriched chalcocite ore. The gossan, approximately six to seven meters thick, is a highly siliceous, iron-rich, friable unit. It displays a three tier lithologic zonation, and contains an unusually high gold concentration (over 1.0 opt Au). The upper two gossan lithologies are composed predominantly of subrounded sand-size quartz grains and pisolitic hematite, with volumetrically minor goethite, jarosite, apatite, native copper, and native gold. The uppermost unit is a white-tan color, and the lower unit is a dark red color. The lowermost gossan unit is composed of azurite, malachite, hematite, and quartz. Field relations indicate the supergene weathering event occurred during the Precambrian.

Gold grains from the Flambeau gossan are subrounded, fine-grained (1 to 20 microns), and extremely pure (> 950 fine Au). These characteristics suggest that protore electrum grains were dissolved as a low temperature, gold-chloride complex in a supergene solution, transported, and precipitated as pure gold. Mass transfer calculations indicate that weathering processes removed most elements and led to a gold enrichment of approximately twenty-six fold. The unusual textures, mineralogy, and coloration of this gossan provide new implications for the exploration and interpretation of gold-rich gossans.