THE UDALL MINE, VERMONT, A STRATIFORM MASSIVE SULFIDE DEPOSIT OF SUBMARINE EXHALATIVE ORIGIN

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ABSTRACT

The Udall mine Cu-Zn deposit is located in the town of Wolcott, Lamoille County Vermont. This stratiform massive sulfide deposit was produced by hydrothermal activity associated with submarine volcanism. Hydrothermal deposits (exhalites), consisting of banded-iron formation along with massive and banded sulfide horizons, are associated with metamorphosed mafic volcanic rocks (greenstones). Whole rock and select trace element analyses suggest that the greenstones are similar in composition to low-potassium oceanic tholeiitic basalts. The meta-basalts are intercalated with deep-water metapelitic sediments (muscovite schist).

Evidence of original sub-seafloor hydrothermal alteration is exemplified by: 1) intense chloritization, 2) introduction and redistribution of MgO and FeO, and 3) addition and/or redistribution of K_2O and SiO_2. Stockwork mineralization, indicative of hydrothermal solution conduits, is present in the greenstone as veinlets and associated disseminations of oxide and sulfide mineral phases.

It is postulated that the Udall mine massive sulfide deposit originated as a result of hydrothermal activity occurring in association with mafic volcanism. This volcanism was produced in a submarine rift environment occurring on the continental rise of the Proto-Atlantic ocean in pre-middle Ordovician time. The deposit resembles Besshi-type massive sulfide deposits. A modern day analogue to this type of deposit is seen in the hydrothermal vent field occurring on the East-Pacific Rise in the Guaymas Basin, Gulf of California.