

***Discussion of models for the formation of Mississippi Valley type deposits
as they may apply to the Carboniferous Basins of Nova Scotia***

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Deposits of the Mississippi Valley Type (MVT) are spatially and genetically associated with carbonate rocks located at the periphery of, and in arches separating, sedimentary basins. In Nova Scotia, the Gays River Pb-Zn deposit has been grouped with the MVT, but together with the Walton barite-polymetallic deposit and a number of smaller prospects and occurrences around the Carboniferous Shubenacadie and Windsor

basins, these deposits show many similarities to the Irish Pb-Zn-Ba deposits, which are excluded from compilations of MVT. Genetic hypotheses ranging from early diagenetic, exhalative syngenetic, through epigenetic related to basinal brine expulsion, to epigenetic related to intrusions, have been proposed in the literature for the Nova Scotia deposits. The proposed age of mineralization for individual members of

the group thus ranges from Viséan to Mesozoic. The purpose of my study is to restrict the possible genetic hypotheses for the Nova Scotia deposits and to formulate a best possible quantitative model using computer modelling.

One of the hypotheses being tested is one recently proposed for Gays River; that the deposit could have been generated by hot connate brines that migrated out of the Windsor and Shubenacadie basins both during initial compaction of the sediments and during dehydration of gypsum to anhydrite. Preliminary calculations suggest that if all the sulphates were originally gypsum, if the brines carried 10 ppm Pb+Zn, and if a large proportion of the fluids were chan-

nelled through the deposit area, the Gays River orebody could have formed by fluids expelled during dehydration of the gypsum in the Shubenacadie basin. Alternatively, fluids could have been generated farther into the Windsor basin, and then migrated a long distance under the evaporite seal.

An assessment of the various genetic hypotheses, by restrictions on the relative and absolute timing of mineralization, and on the source of the metals and the fluids is being sought through isotopic and other methods, including fission track dating of suitable minerals. A fluid-flow model using a two-dimensional finite element method is being constructed.