Are Nova Scotia's Carboniferous Carbonate-hosted Base Metal Deposits and Iron Oxide-Copper-Gold (IOCG) Deposits Close Cousins?

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The potential for carbonate-hosted base metal and barite deposits in the Carboniferous sedimentary basins of Nova Scotia has long been known. Also known as Mississippi Valley-type (MVT) deposits, the most notable examples are the Walton Ba-Pb-Zn-Cu-Ag deposit and the Gays River Pb-Zn deposit, both of which produced for approximately 50 years. There are also a host of lesser deposits that had either much less or minimal production, or had not advanced beyond the exploration stage. These include locations such as Smithfield and Glenbervie in the Stewiacke River valley and Jubilee near Little Narrows in Cape Breton.

Since the middle 1990s it has become apparent that along the regional Cobequid-Chedabucto Fault Zone (CCFZ) in northern Nova Scotia a variety of rock units, most of Carboniferous age, are host to deposits with an affinity to the huge and economically prized iron oxide-Cu-Au class of mineral deposits (IOCG). The CCFZ is host to several former Fe-mining districts, the most notable at Londonderry which produced during the last half of the 19th Century and was an economic mainstay of northern Nova Scotia. In addition, there are numerous deposits and occurrences of Cu-Co±Ni±Au such as Mount Thom, Colchester County, and Copper Lake, Antigonish County, which clearly have an affinity to the IOCG class.

Field relations evident at several sites suggest that there may be a genetic link or continuum between these two diverse mineral deposit types. For example, almost all of the MVT deposits in Nova Scotia have barite as a major commodity and, as is the case at Walton and Brookfield, barite was the commodity of most value. It is interesting, however, that at the currently producing Brookfield Barite Mine, a mere 200 m along strike from the deposit and on the same fault structure that has been determined to be important in localizing the barite deposit, the small past-producing Chambers and Pearson Fe mine is found, in which a considerable amount of barite occurs within the hematite orebody. The Brookfield deposit consists of a barite-siderite orebody while the Chambers and Pearson exists as a hematite-barite orebody. There is a very strong suggestion that the two deposits are genetically linked where the Fe at one deposit (Brookfield) is manifest as siderite while at the other (Chambers and Pearson) it is manifest as hematite. Other examples of the IOCG-type that also have barite enrichment are the Bridgeville Fe district, where hematite ores generally had up to 25% barite, and the Bass River Magnetite Prospect, where barite is present within the carbonate alteration phase within the magnetite and also as a separate barite vein which intruded Carboniferous sediments a few hundred metres to the east. With the MVT deposits such as Walton, it has long been known that the area surrounding the deposit along strike to the east and west is host to several small deposits of Fe and Mn, some of which were mined on a small scale. Clearly there is a halo of Fe-Mn mineralization associated with the formation of the main Walton barite-sulphide orebody.

During the Carboniferous, Nova Scotia was very active tectonically because it was the time of formation and predominant movement along the various splay faults constituting the CCFZ. It is also known that a diverse variety of hydrothermal fluids were being generated during that era and that these fluids were migrating along CCFZ fault structures and forming a spectrum of mineral deposits. The presence of barite in both of the major mineral deposit types present provides a link to suggest both deposit types were forming at the same time and perhaps are close cousins.