

# Review of cobalt within Ni-Cu-PGE and Ni-Cu-Co-Au sulphide occurrences in Silurian mafic intrusions in the New Brunswick Appalachian orogen

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Cobalt occurs as an important component in Ni-Cu-PGE deposits related to mafic or ultramafic intrusions and that formed by the segregation (liquation) and accumulation of dense immiscible sulphide liquids. The abundance of cobalt varies depending on the primitive character of the mafic magmas involved. Large world-class deposits have been found in intrusions related to intracontinental settings or rifted continental margins, and also in convergent environments such as arc settings, but those are typically small. Ni-Cu-PGE mineralization in Canada is associated with a wide range of rock ages, parental magma compositions, geologic settings, host unit geometries, and tectonic settings. Archean deposits (e.g., Abitibi, McFauld's Lake) in general have higher grades of Ni and PGEs, but are also smaller. Proterozoic deposits (e.g., Sudbury, Raglan, Thompson, Voisey's Bay, Lynn Lake) are not always high in grade but can be very large. Except for Norilsk, Phanerozoic deposits (Wellgreen, Turnagain, Giant Mascot) generally have lower Ni and PGEs contents and are smaller.

Several Ni-Cu-PGE occurrences in New Brunswick are associated with Silurian mafic intrusions and have economically interesting concentrations of cobalt. Maliseet North contains significant Co values (up to 0.12%) and is hosted by Goodwin Lake gabbro, which contains both mafic and ultramafic phases. The Wheal Louisiana deposit in southern New Brunswick occurs in quartz-carbonate veins in metasedimentary and mafic rocks and contains 0.06 wt.% cobalt. The Rogers Farm deposit in St. Stephen is hosted by the Moosehorn intrusion; according to different reports, Co content averages around 0.16 wt.%. Portage Brook in north-central New Brunswick is a relatively small Ni-Cu-PGE occurrence with 0.067 wt.% Co; it is also a Silurian mafic to ultramafic intrusion. Mount Webster in northern New Brunswick contains trace Co, Cu, and Ni hosted by a Siluro-Devonian mafic intrusion; average Co content is 0.11 wt.%. Cu-Co-Au mineralization at Ramsay Brook west-southwest of Bathurst is hosted in brecciated and carbonate altered sedimentary rocks adjacent to a mafic intrusion and contains up to 0.9 wt.% Co. Several other Ni-Cu-PGE occurrences have lower Co contents, including Milltown Reservoir, Woodward Farm I, and Murchie farm in the St. Croix belt.