

Nickel-Copper-PGE Mineralization, Exploration and Mining in Ontario

Nickel is an important metal used in the manufacture of high-strength alloys, aerospace components, the chemical and food processing industries, and construction. It is the most important mineral commodity in Ontario, in terms of the value of annual production. Nickel production in 2009 totalled 44,253,260 kilograms valued at \$752,615,193. Total historic nickel production from Ontario is valued at more than \$116 billion (in 2005\$).

In addition, 8,135,836 grams of platinum group elements (PGE) were recovered as by-products from nickel-copper mining operations in the Sudbury area. Total historic PGE production in Ontario is valued at nearly \$20 billion (in 2005\$). In December 2009, North American Palladium Ltd. began the process of restarting operations at its Lac des Iles mine in northwestern Ontario and expects to produce its first concentrate in the second quarter of 2010.

The last several years have seen an increasing demand for nickel in the Asian markets, with a 20 per cent annual growth rate until the global slowdown in late 2008. This expansion led to record commodity prices; doubling of exploration expenditures in the search for base metals, development of new concepts to guide exploration; the discovery of a new mining camp at McFauld's Lake in the James Bay Lowlands; discoveries in the historic Sudbury mining camp and the development of previously uneconomic nickel deposits.

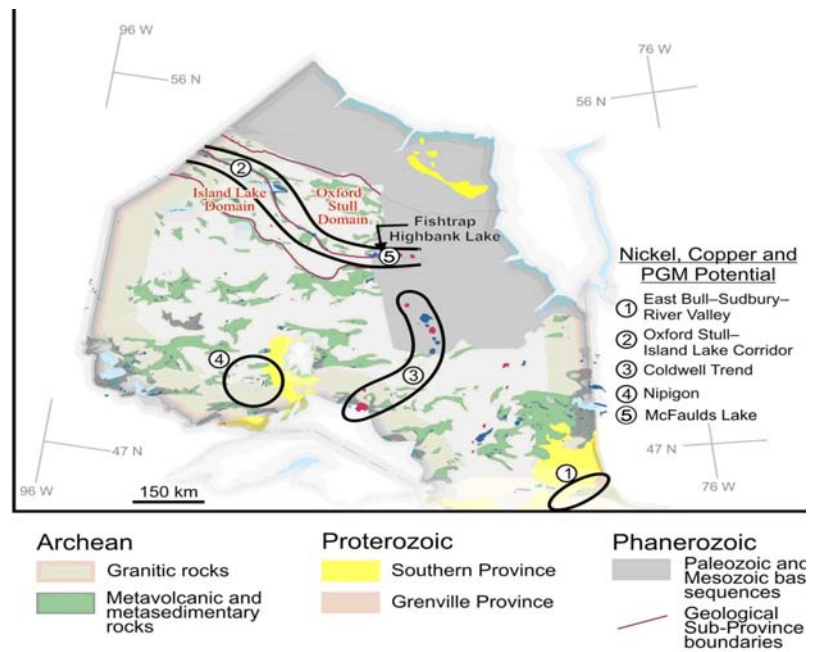
Nickel ores are commonly associated with copper and/or cobalt. By-products also include gold, silver, platinum group elements, and sulphur products. Nickel-copper-PGE deposits types are invariably associated with mafic intrusive or mafic volcanic rocks. A simplified classification based on information from Eckstrand, 1984 and Naldrett, 1981, is as follows:

Layered mafic intrusives	1a. Layered mafic intrusive [Ni-Cu] (e.g. Sudbury – producing mines)
	1b. Layered mafic intrusive [PGE] (e.g. Lac des Iles – producing mine)
	1.c. Altered mafic intrusive [Ni-Cu] (e.g. Timmins – Montcalm deposit)
Mafic volcanic (komatiitic)	2. Extrusive-hosted [Ni-Cu] (e.g. Timmins - Redstone Mine)

Areas in northern Ontario with exploration potential for copper-nickel and platinum group elements are highlighted on the map at the right.

The names and locations of the companies that produce these commodities in Ontario and the locations of their operations are indicated on the map on the back of this page.

In addition, there is potential for economic deposits of copper-nickel and platinum group elements in the Grenville Province in southeastern Ontario where current exploration activity in the area is focused on differentiated mafic intrusive units known to host historical nickel and copper sulphide showings.



Ontario Nickel, Copper, PGE Mines

Xstrata plc

1. Fraser
2. Thayer Lindsley
3. Onaping/Craig
4. Montcalm*

FNX Mining Company Inc.

5. Podolsky
6. McCreedy West*

First Nickel Inc.

7. Lockerby*

Vale Inco

8. Copper Cliff North
9. Copper Cliff South
10. Creighton
11. Garson
12. Gertrude*
13. Lower Coleman
14. McCreedy East
15. Stobie

16. Redstone Mine

North American Palladium Ltd.

17. Lac des Iles*

