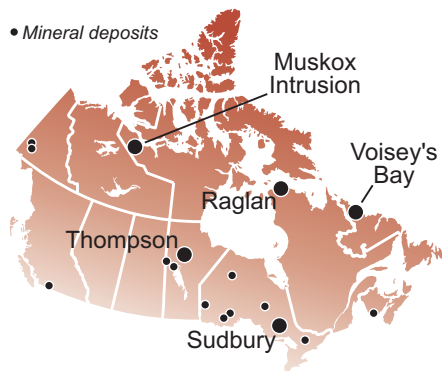




METALS FROM BENEATH THE CRUST

1



How Do They Form?

Rocks that form by melting in the mantle deep below the Earth's crust contain a lot of iron and magnesium. Geologists call them mafic and ultramafic rocks. They sometimes include minerals rich in metals such as nickel, copper, cobalt, chromium, and platinum. The molten rock rises upward and either erupts on the surface as lava, or cools and solidifies below the surface, forming what is known as an intrusion. Not all intrusions contain concentrations of metals, and that's why minable deposits are hard to find.

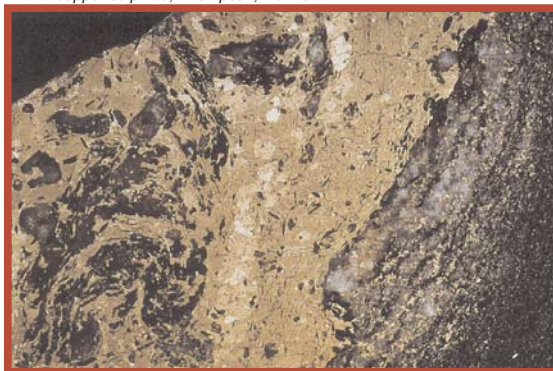
Where Do We Find Them?

Some deposits occur along ancient breaks in the Canadian Shield that mark the edges of former continents. At Thompson, Manitoba and Raglan, Quebec there are nickel deposits that lie along one of these ancient continental margins—more than 2.5 billion years old!

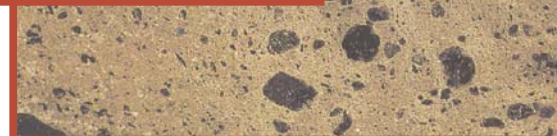
The giant nickel-copper deposits that surround Sudbury, Ontario are among the richest in the world, and lie at the junction of three of these old margins. The Sudbury deposits are unique because they formed in response to a meteorite impact. Over time, the crater has since been squashed by earth movements and eroded beyond easy recognition.

Other deposits occur within large igneous intrusions. The Voisey's Bay deposit in northern Labrador and the Muskox Intrusion in Nunavut are two examples of this type.

Nickel-copper sulphide, Thompson, Manitoba



GSC 1995-226



Nickel-copper sulphide, Sudbury, Ontario

GSC 1995-225C

DID YOU KNOW?

Nickel is used mainly in the production of stainless steel and high-nickel alloys

Nickel, along with iron, is thought to form the Earth's core

In Canada, nickels and pennies are made mostly of steel, not nickel and copper

Over half the copper in Canada is used in electrical applications, mostly wiring

Police are nicknamed cops or coppers because their uniforms once had copper buttons and badges

Cobalt is used in alloys and superalloys, in the aerospace industry, in steel-belted radial tires, and in battery electrodes

Chromium makes steel harder and more resistant to rusting

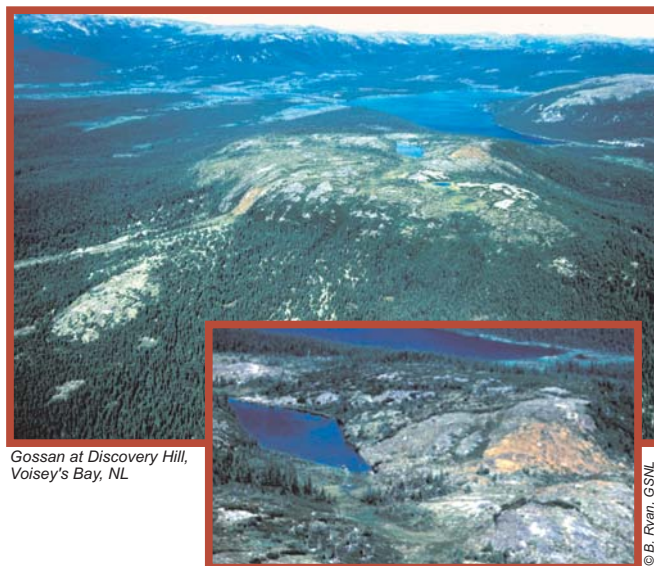
Platinum and palladium are used in catalytic converters to treat car exhaust emissions



METALS FROM BENEATH THE CRUST

The Voisey's Bay Gossan

Many mineral deposits have been found by prospectors who know to search for rusty-looking areas on the ground. These zones, called gossans, form when iron minerals rust. Gossans must be carefully examined because it is common for metals near the surface to be carried away by the acidic water produced by the rusting process. This was particularly important at the Voisey's Bay deposit in Labrador, because, although the gossan zone was huge and could easily be seen from the air, the metals had been leached from the surface. Prospectors in the area kept working—they knew they were onto an important discovery given the size of the gossan, and they were right. The Voisey's Bay deposit is one of the world's largest igneous nickel-copper-cobalt deposits.



Gossan at Discovery Hill, Voisey's Bay, NL

© B. Ryan, Geological Survey of Newfoundland and Labrador

© B. Ryan, GSNL



Concentrator building and accommodations, Voisey's Bay, NL, October 2004

© Voisey's Bay Nickel Co. Ltd.



Concentrator building, Voisey's Bay, NL, November 2004

© Voisey's Bay Nickel Co. Ltd.

The Muskox Intrusion

The Muskox Intrusion is an enormous mafic-ultramafic intrusion, nearly 500 km long. It lies in Nunavut, on the Coppermine River, southeast of Kugluktuk on the Arctic coast. The intrusion held the molten rock, or magma, that produced the Coppermine Basalts, an immense outpouring of lava nearly 5 km thick.

Minerals containing copper, nickel, chromium, platinum, and palladium have been found at the bottom of the intrusion and in a deep depression that may have been the main pathway for rising magma. Despite its remote location, there has been much exploration. But so far nothing has been found to warrant more advanced exploration.