



GOLD

The Metal of Kings

Of all the precious metals, gold has been the most prized throughout history. It is beautiful, easy to work with, and never tarnishes. It has been used for over 5000 years as money and decoration, but now is especially important in the electronics and aerospace industries.

Where Do You Find Gold?

Many of the best-known gold discoveries have been placer deposits, where gold is found as dust, flakes, and nuggets in the sand and gravel of streams and rivers. The gold rush of 1897-1898 started with the discovery of placer gold in a tributary of the Klondike River in Yukon Territory. Today about 5% of the gold in Canada comes from placer mining.

Much more gold, about one-third in Canada, comes as a by-product in mining copper, nickel, zinc, and lead. However, the greatest amount of gold, termed lode gold, is found in bedrock, either as vein gold, or as finely dispersed gold (as at Hemlo, Ontario), or a combination of the two (as at Yellowknife, N.W.T.). Dispersed gold can almost be invisible and hard to find. For example, gold was first discovered in the Hemlo



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Death mask of Tutankhamun



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Gold and quartz, Paymaster Mine, Timmins, Ontario

area in 1869. Many prospectors continued to find traces of gold in the area, but it was not until 1981 that a large deposit was discovered. Most lode gold comes from the volcanic and sedimentary rocks of the Canadian Shield, but the younger rocks of the Cordillera and Appalachians also contain lode gold.

Vein gold forms when hot, gold-bearing fluid flows through faults and fractures in the rocks. These cracks fill up with minerals, mostly quartz, but also gold. The deposits range from a single gold-rich vein that can be mined simply by digging a trench or tunnel, to complex systems of veins that require many levels of underground mining. Examples of vein gold deposits are those of the Yellowknife area, and the Abitibi region of Ontario and Quebec.

Gold has been mined for 6000 years, but 90% of it has been produced since the start of the California gold rush in 1848

Gold is soft: 28 g (1 oz) of gold can be beaten into 16 square metres of gold leaf!

Gold is used in the electronics industry to make more than 10 billion tiny electrical contacts every year

Gold purity is measured in karats—24k gold is 100% gold; 10k gold is 41.7% gold, the rest is some other metal such as silver, copper, or zinc



YELLOWKNIFE GOLD

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Wildcat Cafe, Yellowknife, NWT, ca. 1945

The Discovery that Changed a Town

Yellowknife is named after the Yellowknives Dene who moved into the area in the early 1800s. The yellow in the name refers to the copper they used to make their knives. But the city owes its growth to the discovery of another metal—gold. In the 1930s, prospectors found gold on Yellowknife Bay, and by 1937, the town was booming. The Con Mine went into production in 1938 and the Giant Mine in 1948. Together they produced more than 400 tonnes of gold. The closure of the mines has not ended Yellowknife's connection with mining—it is now the centre for Canadian diamonds.

GSC 199614



Giant Mine, Yellowknife, NWT, 1955

GSC KGS-631

There's No Free Lunch

Gold has been good for Yellowknife, but its production has not been without environmental cost. Since 1948, about 237,000 tonnes of arsenic trioxide dust has been created at the Giant Mine as a result of the roasting process used to break down the gold-bearing arsenopyrite ore. In arsenopyrite, the arsenic is in a stable form and is not a health hazard, but arsenic trioxide is toxic. The dust is stored underground, and at one time it was thought that the natural permafrost would seal the storage chambers. However, open pit mining on the surface caused the permafrost to thaw. To minimize the danger, the solution now favoured is to artificially freeze these chambers so that there will be no seepage of water into or out of the frozen zones, and thus no release of arsenic into the environment. This, and continuous monitoring and treating of groundwater from the area will be expensive—estimated costs are \$200-300 million.