

unique attributes of the PGMs, including remarkable catalytic properties, chemical inertness, stability as electrical contacts and resistance to high temperature oxidation, make them indispensable in many industrial applications.

One of the largest single uses for PGMs is in the production of automobile exhaust catalysts. This use is expected to increase significantly in the future as governments move to introduce or improve automobile emission standards.

As a result of continuing political and labour problems in South Africa, prices rose dramatically during 1986, with platinum and palladium reaching US\$665 and US\$151 per ounce, respectively. Average 1985 prices were US\$192.47 for platinum and US\$107.76 per ounce for palladium.

Due to rising world prices, PGM exploration in Canada and several other countries intensified during 1986. While preliminary exploration has identified areas of significant potential in Canada, there will be additional investigation before development can proceed.

**Molybdenum.** Canada ranks fourth among the world's leading molybdenum producers, accounting for about 15% of the western world's total supply. Over 95% of Canada's molybdenum is produced in British Columbia; Quebec is the only other producing province. Ontario and New Brunswick mines have installed capacities during the last two years for the recovery of by-product molybdenum at some time in the future.

Canadian mine shipments in 1985 were at the lowest level since the mid-1960s, a result of the closure of three primary mines and several byproduct producers. In 1986, however, shipments increased by 64% to 12 914 t. The large increase was primarily due to the reopening of one large primary mine and the return to full production at a byproduct producer that was reopened late in 1985.

Canada is one of the world's major exporters of molybdenum, shipping most of its annual output to Western Europe and Japan.

**Cobalt.** Canada is the world's fourth largest producer of cobalt, behind Zaire, Zambia and the Soviet Union. In 1986, Canada produced about 2 500 t of cobalt valued at \$56 million, compared to 2 100 t valued at \$72 million in 1985.

Cobalt is recovered as a byproduct of nickel-copper production. Mines are in operation at Sudbury, Ont. and Thompson, Man. At Port Colborne, Ont., a cobalt refinery which has a capacity of 900 tpy of electrolytic cobalt rounds is in operation. The refinery was opened in 1983 and high quality cobalt metal is produced for use primarily in making superalloys. A refinery

at Fort Saskatchewan, Alta. toll and custom refines cobalt obtained from other producers, mostly abroad.

A major use for cobalt is in superalloys where it improves the strength, wear and corrosion resistance of the alloys at elevated temperatures. The major application of cobalt-base superalloys is in turbine blades for aircraft jet engines and gas turbines for gas pipelines. Cobalt-based superalloys normally contain 45% or more cobalt.

Other important uses for cobalt are in magnets and abrasion-resistant and heat-resistant tools. Cobalt is also used to promote the adherence of enamel to steel in applications such as appliances, and of steel to rubber in the manufacture of steel-belted tires.

**Magnesium.** Canada's only existing producer of primary magnesium operates an 11 000 tpy reduction facility at Haley, Ont. about 80 km west of Ottawa. A four-year expansion and modernization program announced during 1986, is expected to increase magnesium production by 50%.

In October 1986, a Norwegian company formally announced that it would build a new 60 000 tpy magnesium smelter at Bécancour, Que. This new facility, on which construction was expected to begin in the spring of 1987, should be completed by 1989 at a cost of \$400 million.

The largest single use for magnesium is as an alloying agent for aluminum. The addition of magnesium to aluminum imparts greater tensile strength, increased hardness and better corrosion resistance. The second largest use for magnesium is for structural applications of which pressure diecast products constitute the most important component. While the number of diecast products, particularly auto parts, is growing, increased magnesium usage is constrained by its high cost relative to competing aluminum. During 1986, the quoted price for magnesium ingot was US\$1.53 per pound.

**Columbium.** Canada is the second largest producer country of columbium, with an annual output of about 15% of the world's total supply. Production increased by 12% in 1985 and another 6% in 1986. Canada's concentrate is produced at Chicoutimi, Que. from pyrochlore ore, one of the three pyrochlore operations in the world; the other two are in Brazil.

Canada became the only major supplier of columbium concentrate following a decision by the Brazilian producers in 1981 to convert all their output to intermediate products.