

COBALT

(Data in metric tons of cobalt content, unless otherwise noted)

Domestic Production and Use: The United States did not mine or refine cobalt in 1999; however, negligible amounts of byproduct cobalt were produced as intermediate products from some mining operations. U.S. supply was comprised of imports, stock releases, and secondary materials such as superalloy scrap, cemented carbide scrap, and spent catalysts. There were two domestic producers of extra-fine cobalt powder: One produced powder from imported primary metal, and another produced powder from recycled materials. In addition to the powder producers, six companies were known to be active in the production of cobalt compounds. More than 100 industrial consumers were surveyed on a monthly or annual basis. Approximately 45% of U.S. cobalt usage was in superalloys, which are used primarily in aircraft gas turbine engines; 9% was in cemented carbides for cutting and wear-resistant applications; 8% was in magnetic alloys; and the remaining 38% was in various other metallic and chemical uses. The total estimated value of cobalt consumed in 1999 was \$350 million.

Salient Statistics—United States:	1995	1996	1997	1998	1999^e
Production: Mine	—	—	—	—	—
Secondary	1,860	2,280	2,750	3,080	3,100
Imports for consumption	6,440	6,710	8,430	7,670	8,200
Exports	1,300	1,660	1,570	1,680	1,500
Shipments from Government stockpile excesses	1,550	2,050	1,620	2,310	1,700
Consumption:					
Reported (includes secondary)	7,590	7,990	8,910	9,180	9,200
Apparent (includes secondary)	8,970	9,380	11,200	11,500	11,500
Price, average annual spot for cathodes, dollars per pound	29.21	25.50	23.34	21.43	17.00
Stocks, industry, yearend	1,080	1,070	1,090	1,000	1,000
Net import reliance ¹ as a percent of apparent consumption	79	76	76	73	73

Recycling: About 3,100 tons of cobalt was recycled from purchased scrap in 1999. This represented about 34% of estimated reported consumption for the year.

Import Sources (1995-98): Cobalt content of metal, oxide, and salts: Norway, 24%; Finland, 18%; Canada, 14%; Zambia, 13%; and other, 31%.

Tariff: Item	Number	Normal Trade Relations² 12/31/99
Unwrought cobalt, alloys	8105.10.3000	4.4% ad val.
Unwrought cobalt, other	8105.10.6000	Free.
Cobalt matte, waste, and scrap	8105.10.9000	Free.
Wrought cobalt and cobalt articles	8105.90.0000	3.7% ad val.
Chemical compounds:		
Cobalt oxides and hydroxides	2822.00.0000	0.1% ad val.
Cobalt sulfates	2833.29.1000	1.4% ad val.
Cobalt chlorides	2827.34.0000	4.2% ad val.
Cobalt carbonates	2836.99.1000	4.2% ad val.
Cobalt acetates	2915.23.0000	4.2% ad val.
Cobalt ores and concentrates	2605.00.0000	Free.

Depletion Allowance: 23% (Domestic), 15% (Foreign).

Government Stockpile: Sales of National Defense Stockpile cobalt began in March 1993. The Annual Materials Plan of the Defense Logistics Agency, U.S. Department of Defense, includes a cobalt disposal limit of 2,720 tons (6.0 million pounds) during fiscal year 2000.

Stockpile Status—9-30-99³

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 1999	Disposals FY 1999
Cobalt	12,800	495	12,800	2,720	1,960

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Events, Trends, and Issues: In 1999, two internet web sites were established for selling cobalt. One site was established by the marketing division of a cobalt producer to sell their product, and the other was established by a brokerage firm for spot market and forward sales of cobalt from various sources.

World cobalt production is expected to continue to increase during the next few years as the Australian nickel laterite projects bring production up to planned levels. Cobalt supply during this period will also include cobalt in recycled scrap and sales from the U.S. Government's National Defense Stockpile. Demand for cobalt in any given year will depend on world economic conditions. In the near to medium term, the overall growth in cobalt demand is anticipated to be between 3% and 6% per year. In the medium to long term, cobalt supply is expected to grow faster than demand. A generally downward trend in cobalt prices would be the likely response to a growing market surplus. During the first 11 months of 1999, the average spot price of cobalt cathode varied between \$8.50 per pound and \$21.25 per pound.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁴	Reserve base ⁴
	1998	1999 ^e		
United States	—	—	—	860,000
Australia	3,300	3,700	680,000	920,000
Canada	6,000	5,900	45,000	260,000
Congo (Kinshasa) ⁵	1,500	3,000	2,000,000	2,500,000
Cuba	2,200	2,200	1,000,000	1,800,000
New Caledonia ⁶	1,000	1,000	230,000	860,000
Philippines	—	—	—	400,000
Russia	3,200	3,400	140,000	230,000
Zambia	7,000	7,000	360,000	540,000
Other countries	<u>2,100</u>	<u>2,100</u>	<u>90,000</u>	<u>1,200,000</u>
World total (may be rounded)	26,300	28,300	4,500,000	9,600,000

World Resources: The cobalt resources of the United States are estimated to be about 1.3 million tons. Most of these resources are in Minnesota, but other important occurrences are in Alaska, California, Idaho, Missouri, Montana, and Oregon. Although large, most domestic resources are in subeconomic concentrations that are not expected to be economical in the foreseeable future. In addition, with the exception of resources in Idaho, any cobalt production from these deposits would be as a byproduct of another metal. The identified world cobalt resources are about 11 million tons. The vast majority of these resources are in nickel-bearing laterite deposits, with most of the rest occurring in nickel-copper sulfide deposits hosted in mafic and ultramafic rocks in Australia, Canada, and Russia, and in the sedimentary copper deposits of Congo (Kinshasa) and Zambia. In addition, millions of tons of hypothetical and speculative cobalt resources exist in manganese nodules and crusts on the ocean floor.

Substitutes: Periods of high prices and concern about availability have resulted in various efforts to conserve, reduce, or substitute for cobalt. In many applications, further substitution of cobalt would result in a loss in product performance. Potential substitutes include barium or strontium ferrites, neodymium-iron-boron, or nickel-iron alloys in magnets; nickel, cermet, or ceramics in cutting and wear-resistant materials; nickel base alloys or ceramics in jet engines; nickel in petroleum catalysts; rhodium in hydroformylation catalysts; nickel or manganese in batteries; and manganese, iron, cerium, or zirconium in paints.

^eEstimated.

¹Defined as imports - exports + adjustments for Government and industry stock changes.

²No tariff for Canada or Mexico.

³See Appendix B for definitions.

⁴See Appendix C for definitions.

⁵Formerly Zaire.

⁶Overseas territory of France.