

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 2000; 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, seven 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; 9% was in magnetic alloys; and the remaining 37% was in various other metallic and chemical uses. The total estimated value of cobalt consumed in 2000 was \$300 million.

Salient Statistics—United States:	1996	1997	1998	1999	2000^e
Production: Mine	—	—	—	—	—
Secondary	2,280	2,750	3,080	2,720	2,800
Imports for consumption	6,710	8,430	7,670	8,150	8,000
Exports	1,660	1,570	1,680	1,550	2,300
Shipments from Government stockpile excesses	2,050	1,620	2,310	1,530	2,300
Consumption:					
Reported (includes secondary)	7,990	8,910	9,130	8,420	8,400
Apparent (includes secondary)	9,380	11,200	11,500	10,700	10,900
Price, average annual spot for cathodes, dollars per pound	25.50	23.34	21.43	17.02	15.50
Stocks, industry, yearend	1,070	1,090	1,000	1,160	1,060
Net import reliance ¹ as a percent of apparent consumption	76	76	73	75	74

Recycling: About 2,800 tons of cobalt was recycled from purchased scrap in 2000. This represented about 33% of estimated reported consumption for the year.

Import Sources (1996-99): Cobalt content of metal, oxide, and salts: Norway, 23%; Finland, 20%; Zambia, 13%; Canada, 12%; and other, 32%.

Tariff: Item	Number	Normal Trade Relations² 12/31/00
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: 22% (Domestic), 14% (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 million pounds) during fiscal year 2001.

Stockpile Status—9-30-00³

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2000	Disposals FY 2000
Cobalt	10,100	1,020	10,100	2,720	2,720

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Events, Trends, and Issues: World cobalt production is expected to continue to increase. Recently commissioned projects in Australia and Uganda plan to ramp up their production during the next few years, and output from established producers is likely to increase from 1999 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 depends upon 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 10 months of 2000, the average spot price of cobalt cathode varied between \$13.50 per pound and \$17.50 per pound.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁴	Reserve base ⁴
	1999	2000 ^e		
United States	—	—	—	860,000
Australia	4,100	5,700	880,000	1,300,000
Canada	5,300	5,000	45,000	260,000
Congo (Kinshasa) ⁵	7,000	7,000	2,000,000	2,500,000
Cuba	2,200	2,300	1,000,000	1,800,000
New Caledonia ⁶	1,100	1,100	230,000	860,000
Philippines	NA	NA	NA	400,000
Russia	3,300	4,000	140,000	230,000
Zambia	4,700	4,000	360,000	540,000
Other countries	<u>2,300</u>	<u>3,200</u>	<u>90,000</u>	<u>1,200,000</u>
World total (rounded)	29,900	32,300	4,700,000	9,900,000

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. With the exception of resources in Idaho and Missouri, 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, cermets, 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. NA Not available.

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

²No tariff for Canada and Mexico for items shown.

³See Appendix B for definitions.

⁴See Appendix C for definitions.

⁵Formerly Zaire.

⁶Overseas territory of France.