

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 2003; however, negligible amounts of byproduct cobalt were produced as intermediate products from some mining operations. U.S. supply comprised 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 cemented carbide scrap. In addition to the powder producers, six companies were known to produce cobalt compounds. Nearly 90 industrial consumers were surveyed on a monthly or annual basis. Data reported by these consumers indicate that approximately 47% of U.S. cobalt use was in superalloys, which are used primarily in aircraft gas turbine engines; 8% was in cemented carbides for cutting and wear-resistant applications; 20% was in various other metallic uses; and the remaining 25% was in a variety of chemical uses. The total estimated value of cobalt consumed in 2003 was \$200 million.

Salient Statistics—United States:	1999	2000	2001	2002	2003^e
Production:					
Mine	—	—	—	—	—
Secondary	2,720	2,550	2,780	2,800	2,200
Imports for consumption	8,150	8,770	9,410	8,450	8,000
Exports	1,550	2,630	3,210	2,080	2,500
Shipments from Government stockpile excesses	1,530	2,960	3,050	524	2,200
Consumption:					
Reported (includes secondary)	8,660	8,980	9,540	7,930	8,000
Apparent (includes secondary)	10,700	11,600	11,800	9,860	10,000
Price, average annual spot for cathodes, dollars per pound	17.02	15.16	10.55	6.91	9.40
Stocks, industry, yearend	1,160	1,180	1,370	1,200	1,100
Net import reliance ¹ as a percentage of apparent consumption	75	78	76	72	78

Recycling: An estimated 2,200 tons of cobalt was recycled from purchased scrap in 2003. This represented 28% of estimated reported consumption for the year.

Import Sources (1999-2002): Cobalt content of metal, oxide, and salts: Finland, 24%; Norway, 18%; Russia, 13%; Canada, 10%; and other, 35%.

Tariff: Item	Number	Normal Trade Relations² 12/31/03
Unwrought cobalt, alloys	8105.20.3000	4.4% ad val.
Unwrought cobalt, other	8105.20.6000	Free.
Cobalt mattes and other intermediate products; cobalt powders	8105.20.9000	Free.
Cobalt waste and scrap	8105.30.0000	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 2004.

Material	Stockpile Status—9-30-03³				
	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2003	Disposals FY 2003
Cobalt	4,620	306	4,620	2,720	2,060

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Events, Trends, and Issues: World production of refined cobalt has steadily increased since 1993. Some of the increase has been from new operations, and some has been from a net increase in production by established producers. During this period, sales of cobalt from the National Defense Stockpile and cobalt in recycled scrap have also contributed to supply. Estimated availability of refined cobalt increased in 2003. World refinery production during the first half of the year was slightly higher than that of the first half of 2002 and shipments of cobalt from the Defense National Stockpile Center were significantly higher during the first 9 months of 2003 than during the entire year of 2002.

World demand for cobalt is strongly influenced by general economic conditions and by demand from industries that consume large quantities of cobalt, such as superalloy melters and manufacturers of rechargeable batteries. In 2003, demand for cobalt was affected by continued weak general economic conditions and depressed demand from the superalloy sector, which used cobalt to make turbine engine parts for jet aircraft and land-based energy-generating turbines. Demand for cobalt to manufacture rechargeable batteries for portable electronic devices such as cellular phones increased, however.

Cobalt prices increased in 2003, reportedly as a result of tightness in supply. The estimated annual average price of cobalt for 2003 was higher than that of 2002, reversing the steady downward trend in annual average cobalt prices that began in 1996.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁴	Reserve base ⁴
	2002	2003 ^e		
United States	—	—	NA	860,000
Australia	6,700	6,600	1,500,000	1,700,000
Brazil	1,200	1,300	35,000	40,000
Canada	5,100	4,700	90,000	300,000
Congo (Kinshasa)	12,500	10,000	3,400,000	4,700,000
Cuba	3,400	3,200	1,000,000	1,800,000
Morocco	1,300	1,300	20,000	NA
New Caledonia ⁵	1,400	1,400	230,000	860,000
Russia	4,600	5,000	250,000	350,000
Zambia	10,000	12,000	270,000	680,000
Other countries	1,400	1,400	200,000	1,500,000
World total (may be rounded)	47,600	46,900	7,000,000	13,000,000

World Resources: Identified cobalt resources of the United States are estimated to be about 1 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 future cobalt production from these deposits would be as a byproduct of another metal. Identified world cobalt resources are about 15 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: In most applications, 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; iron, manganese, or nickel in batteries; and manganese, iron, cerium, or zirconium in paints.

^eEstimated. NA Not available. — Zero.

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.

⁵Overseas territory of France.