

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 2004; 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 cemented carbide scrap, spent catalysts, and superalloy scrap. 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, seven companies were known to produce cobalt compounds. More than 70 industrial consumers were surveyed on a monthly or annual basis. Data reported by these consumers indicate that approximately 44% of U.S. cobalt use was in superalloys, which are used mainly in aircraft gas turbine engines; 9% was in cemented carbides for cutting and wear-resistant applications; 21% was in various other metallic uses; and the remaining 26% was in a variety of chemical uses. The total estimated value of cobalt consumed in 2004 was \$500 million.

Salient Statistics—United States:	2000	2001	2002	2003	2004^e
Production:					
Mine	—	—	—	—	—
Secondary	2,550	2,780	2,800	2,140	2,500
Imports for consumption	8,770	9,410	8,450	8,080	8,600
Exports	2,630	3,210	2,080	2,710	2,700
Shipments from Government stockpile excesses	2,960	3,050	524	2,380	1,700
Consumption:					
Reported (includes secondary)	8,980	9,540	7,940	7,640	8,000
Apparent ¹ (includes secondary)	11,600	11,800	9,860	10,000	10,200
Price, average annual spot for cathodes, dollars per pound	15.16	10.55	6.91	10.60	24.50
Stocks, industry, yearend	1,180	1,370	1,200	1,060	950
Net import reliance ² as a percentage of apparent consumption	78	76	72	79	76

Recycling: In 2004, cobalt contained in purchased scrap represented an estimated 31% of total reported cobalt consumption.

Import Sources (2000-03): Cobalt content of metal, oxide, and salts: Finland, 22%; Norway, 18%; Russia, 16%; Canada, 9%; and other, 35%.

Tariff:	Item	Number	Normal Trade Relations³ 12-31-04
	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 2005.

Material	Stockpile Status—9-30-04⁴				
	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2004	Disposals FY 2004
Cobalt	2,660	46	2,660	2,720	1,920

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Events, Trends, and Issues: The availability of refined cobalt increased during the first half of 2004 as compared with the first half of 2003. World refinery production was higher, and shipments of cobalt from the National Defense Stockpile continued to contribute to supply. Cobalt prices remained high during the first 10 months of 2004, reflecting strong demand. High prices have begun to impact consumption, however. For example, several producers of rechargeable batteries have developed lithium-ion cells that substitute cobalt with a lower cost mix of cobalt, nickel, and manganese.

Health, safety, and environmental issues are becoming increasingly significant to metals such as cobalt. The European Commission's new chemicals policy, if implemented as proposed, would affect all suppliers of cobalt materials to the European market by requiring them to collect and submit risk assessment data on each material produced in or imported into the European Union.

World Mine Production, Reserves, and Reserve Base: Reserve estimate for Australia was revised downward from that previously published based on information reported by the Government of Australia. Reserve and reserve base estimates for Canada were revised upward based on information reported by major Canadian nickel sulfide ore producers.

	Mine production		Reserves ⁵	Reserve base ⁵
	2003	2004 ^e		
United States	—	—	NA	860,000
Australia	6,900	7,000	1,400,000	1,700,000
Brazil	1,300	1,300	35,000	40,000
Canada	4,300	5,200	140,000	350,000
Congo (Kinshasa)	12,000	11,000	3,400,000	4,700,000
Cuba	3,000	3,400	1,000,000	1,800,000
Morocco	1,300	1,300	20,000	NA
New Caledonia ⁶	1,400	1,500	230,000	860,000
Russia	4,800	4,800	250,000	350,000
Zambia	11,300	9,000	270,000	680,000
Other countries	2,100	2,400	200,000	1,500,000
World total (rounded)	48,400	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; cobalt-manganese-nickel in lithium-ion batteries; and cerium, iron, lead, manganese, or vanadium in paints.

^eEstimated. NA Not available. — Zero.

¹The sum of U.S. secondary production, as estimated from consumption of purchased scrap, and net import reliance.

²Defined as imports – exports + adjustments for Government and industry stock changes.

³No tariff for Canada or Mexico.

⁴See [Appendix B](#) for definitions.

⁵See [Appendix C](#) for definitions.

⁶Overseas territory of France.