

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 2006; 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. Of the two producers of extra-fine cobalt powder in the United States, one produced powder from imported primary metal and another produced powder from cemented carbide scrap. Seven companies were known to produce cobalt compounds. Nearly 70 industrial consumers were surveyed on a monthly or annual basis. Data reported by these consumers indicate that nearly one-half of the cobalt consumed in the United States was for use in superalloys, which are used mainly in aircraft gas turbine engines; 9% was for use in cemented carbides for cutting and wear-resistant applications; 18%, for various other metallic applications; and 24%, for a variety of chemical applications. The total estimated value of cobalt consumed in 2006 was \$350 million.

Salient Statistics—United States:	2002	2003	2004	2005	2006^e
Production:					
Mine	—	—	—	—	—
Secondary	2,750	2,130	2,300	2,030	2,200
Imports for consumption	8,450	8,080	8,720	11,100	11,800
Exports	2,080	2,710	2,510	2,440	2,900
Shipments from Government stockpile excesses	524	2,380	1,630	1,110	200
Consumption:					
Reported (includes secondary)	7,880	7,590	8,450	8,430	8,800
Apparent ¹ (includes secondary)	9,830	10,000	9,920	11,900	11,300
Price, average annual spot for cathodes, dollars per pound	6.91	10.60	23.93	15.96	15.90
Stocks, industry, yearend	1,140	1,010	1,240	1,150	1,150
Net import reliance ² as a percentage of apparent consumption	72	79	77	83	81

Recycling: In 2006, cobalt contained in purchased scrap represented an estimated 25% of cobalt reported consumption.

Import Sources (2002-05): Cobalt contained in metal, oxide, and salts: Norway, 21%; Russia, 17%; Finland, 14%; Canada, 9%; and other, 39%.

Tariff: Item	Number	Normal Trade Relations³ 12-31-06
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 disposal limit for cobalt in the fiscal year 2007 Annual Materials Plan was reduced to 1,590 tons.

Stockpile Status—9-30-06⁴

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2006	Disposals FY 2006
Cobalt	1,360	106	1,360	2,720	200

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Events, Trends, and Issues: The worldwide availability of refined cobalt was slightly lower during the first half of 2006 compared with that of the first half of 2005 primarily because of reduced shipments of cobalt from the National Defense Stockpile. World demand for cobalt reportedly was slightly higher during the first half of 2006 than that of the first half of 2005. The price of cobalt cathode fluctuated between \$12.75 and \$20.50 per pound during the first 10 months of 2006.

In recent years, exports of cobalt-rich ores from Congo (Kinshasa) to refineries mainly in China have helped to balance world cobalt supply and demand. Future export of these ores could be affected by declining ore grades, higher copper prices (which could influence miners and smelters to shift to copper production), the availability and increasing cost of transportation, efforts by the Government of Congo (Kinshasa) to require that cobalt ores be processed before being exported, and increased involvement of international mining companies in Congo (Kinshasa).

A North Carolina plant that produced extra-fine cobalt powder was to cease operations by the end of the third quarter. The company planned to continue to produce cobalt powders at plants in Belgium, Canada, and China.

Health, safety, and environmental issues are becoming increasingly significant with respect to such metals as cobalt. The European Commission's new chemicals policy, if implemented as proposed, would affect 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: Reserves and/or reserve base estimates for Australia, Brazil, and Canada were revised based on new information reported by mining companies or foreign Governments.

	Mine production		Reserves ⁵	Reserve base ⁵
	2005	2006 ^e		
United States	—	—	NA	860,000
Australia	6,000	6,000	1,400,000	1,700,000
Brazil	1,200	1,000	29,000	40,000
Canada	5,500	5,600	120,000	350,000
China	1,300	1,400	72,000	470,000
Congo (Kinshasa)	22,000	22,000	3,400,000	4,700,000
Cuba	3,600	4,000	1,000,000	1,800,000
Morocco	1,600	1,500	20,000	NA
New Caledonia ⁶	1,200	1,100	230,000	860,000
Russia	5,000	5,100	250,000	350,000
Zambia	9,300	8,600	270,000	680,000
Other countries	1,200	1,200	130,000	1,100,000
World total (rounded)	57,900	57,500	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. Tariffs for other countries for some items may be eliminated under special trade agreements.

⁴See Appendix B for definitions.

⁵See Appendix C for definitions.

⁶Overseas territory of France.