

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 2001; 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 recycled materials. In addition to the powder producers, seven companies were known to be active in the production of cobalt compounds. Nearly 90 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 primarily in aircraft gas turbine engines; 9% was in cemented carbides for cutting and wear-resistant applications; 20% was in various other metallic uses; and the remaining 27% was in a variety of chemical uses. The total estimated value of cobalt consumed in 2001 was \$250 million.

Salient Statistics—United States:	1997	1998	1999	2000	2001^e
Production:					
Mine	—	—	—	—	—
Secondary	2,750	3,080	2,720	2,550	2,500
Imports for consumption	8,430	7,670	8,150	8,770	9,400
Exports	1,570	1,680	1,550	2,630	3,000
Shipments from Government stockpile excesses	1,620	2,310	1,530	2,960	2,300
Consumption:					
Reported (includes secondary)	8,910	9,130	8,410	8,700	8,500
Apparent (includes secondary)	11,200	11,500	10,700	11,700	11,200
Price, average annual spot for cathodes, dollars per pound	23.34	21.43	17.02	15.16	10.70
Stocks, industry, yearend	1,090	1,000	1,160	1,140	1,150
Net import reliance ¹ as a percentage of apparent consumption	76	73	75	78	78

Recycling: About 2,500 tons of cobalt was recycled from purchased scrap in 2001. This represented about 29% of estimated reported consumption for the year.

Import Sources (1997-2000): Cobalt content of metal, oxide, and salts: Finland, 22%; Norway, 21%; Canada, 11%; Russia, 11%; and other, 35%.

Tariff: Item	Number	Normal Trade Relations² 12/31/01
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 2002.

Stockpile Status—9-30-01³

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2001	Disposals FY 2001
Cobalt	7,890	299	7,890	2,720	2,210

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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.

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 2001, several factors reduced overall demand for cobalt, including weak economic conditions in major consuming countries such as the United States and Japan, and a decrease in the production of rechargeable batteries so that battery inventories would be reduced. In September, terrorist attacks in the United States caused economic uncertainty, concern that renewed U.S. industrial activity would be delayed, and financial problems for the U.S. commercial airline industry, a major consumer of superalloys.

Since 1995, the general trend in cobalt prices has been downward. This trend is likely to continue if cobalt supply continues to increase at a faster rate than that of cobalt demand, or if cobalt demand decreases without a reduction in supply.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves ⁴	Reserve base ⁴
	2000	2001 ^e		
United States	—	—	NA	860,000
Australia	5,600	6,500	1,300,000	1,600,000
Canada	5,300	5,000	45,000	260,000
Congo (Kinshasa)	7,000	7,000	NA	2,500,000
Cuba	2,400	2,600	1,000,000	1,800,000
New Caledonia ⁵	1,100	1,100	230,000	860,000
Philippines	NA	NA	NA	400,000
Russia	3,600	4,000	140,000	230,000
Zambia	4,600	7,000	360,000	540,000
Other countries	3,700	3,700	90,000	1,200,000
World total (may be rounded)	33,300	36,900	3,200,000	10,000,000

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; 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.