COBALT

(Data in metric tons of cobalt content, unless noted)

Domestic Production and Use: Domestic mine production ceased at the end of 1971, and the only U.S. cobalt refinery stopped processing imported nickel-cobalt matte in late 1985. Most secondary cobalt is derived from recycled superalloy or cemented carbide scrap and from spent catalysts. About 13 recyclers accounted for nearly all the cobalt recycled in superalloy scrap. There were two 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 processors were known to be active in the production of cobalt compounds. More than 100 industrial consumers were surveyed on a monthly or annual basis. About 85% of U.S. consumption of cobalt was in five major end uses. Superalloys, used mainly in aircraft gas turbine engines, accounted for about 40% of U.S. demand; catalysts, approximately 13%; paint driers, about 12%; magnetic alloys, about 10%; cemented carbides, about 10%; and other uses, 15%. The total estimated value of cobalt consumed in 1995 was $450 million.

Salient Statistics—United States:	1991	1992	1993	1994	1995[e]
Production: Mine	—	—	—	—	—
Secondary	1,580	1,610	1,570	1,510	1,500
Imports for consumption	6,920	5,760	5,950	6,780	6,800
Exports	1,540	1,420	795	1,360	1,400
Shipments from Government stockpile excesses	—	—	289	1,500	1,100
Consumption:					
Reported (includes secondary)	7,190	6,370	6,420	6,870	6,900
Apparent (includes secondary)	7,790	6,590	7,310	8,400	8,400
Price, average annual spot for cathodes, dollars per pound	16.92	22.93	13.79	24.66	28.70
Stocks, industry, yearend	2,400	1,760	1,460	1,500	1,100
Net import reliance[1] as a percent of apparent consumption	80	76	79	82	82

Recycling: About 1,500 tons of cobalt was recycled from purchased scrap in 1995. This represented about 22% of estimated reported consumption for the year.

Import Sources (1991-94): Cobalt contained in metal, oxide, and salts: Zambia, 26%; Norway, 16%; Canada, 14%; Zaire, 14%; and other, 30%. Since 1991, imports from Canada, Zaire, and Zambia have decreased, while imports from Finland, Norway, and Russia have increased.

Tariff: Item	Number	Most favored nation (MFN)[2] 12/31/95	Non-MFN[3] 12/31/95
Unwrought cobalt, alloys	8105.10.3000	5.3% ad val.	45% ad val.
Unwrought cobalt, other	8105.10.6000	Free	Free.
Cobalt matte, waste and scrap	8105.10.9000	Free	Free.
Wrought cobalt and cobalt articles	8105.90.0000	5.1% ad val.	45% ad val.
Chemical compounds:			
Cobalt oxides and hydroxides	2822.00.0000	0.1% ad val.	1.7% ad val.
Cobalt sulfates	2833.29.1000	1.4% ad val.	6.5% ad val.
Cobalt chlorides	2827.34.0000	4.2% ad val.	30% ad val.
Cobalt carbonates	2836.99.1000	4.2% ad val.	30% ad val.
Cobalt acetates	2915.23.0000	4.2% ad val.	30% ad val.
Cobalt ores and concentrates	2605.00.0000	Free	Free.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: Sales of National Defense Stockpile cobalt began in March 1993. According to the Defense Logistics Agency's Annual Materials Plan for fiscal year 1996, the maximum amount of cobalt that could be sold in the year beginning October 1, 1995, would be 1,810 tons (4 million pounds).

Stockpile Status—9-30-95

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposals Jan.-Sept. 95
Cobalt	20,100	1,010	1,930	1,830

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Events, Trends, and Issues: World cobalt supply and demand were considered to be in close balance. World refinery production in the first half of 1995 was higher than production during the first half of 1994. Cobalt exports from Russia and sales from the National Defense Stockpile continued to contribute to supply. In spite of the supply/demand balance, prices remained high. The free market price for cobalt cathode was between $27 and $31 per pound from January through mid-October. The cobalt reference price set by Zaire and Zambia was $25 per pound from October 1994 through mid-February 1995, when it was increased to $27.50 per pound.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves[4]	Reserve base[4]
	1994	1995[e]		
United States	—	—	—	860,000
Albania	10	—	—	23,000
Australia	2,100	2,400	23,000	90,000
Canada	4,330	5,100	45,000	260,000
Cuba	1,000	1,100	1,000,000	1,800,000
New Caledonia[5]	800	800	230,000	860,000
Philippines	—	—	—	400,000
Russia	3,300	3,300	140,000	230,000
Zaire	2,000	2,000	2,000,000	2,500,000
Zambia	3,500	3,300	360,000	540,000
Other countries	1,490	1,500	90,000	1,200,000
World total (may be rounded)	18,500	19,500	4,000,000	8,800,000

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. Although large, most domestic resources are in subeconomic concentrations that will not be economical in the foreseeable future. In addition, with the exception of Idaho, 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 Zaire 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 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 hydroformulation catalysts; and manganese, iron, cerium, or zirconium in paints.

[e]Estimated.

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

[2]No tariff for Canada or Mexico.

[3]See Appendix B.

[4]See Appendix C for definitions.

[5]Overseas territory of France.