

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 2008; 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. The sole U.S. producer of extra-fine cobalt powder used cemented carbide scrap as feed. Seven companies were known to produce cobalt compounds. More than 60 industrial consumers were surveyed on a monthly or annual basis. Data reported by these consumers indicate that 46% of the cobalt consumed in the United States was used in superalloys, mainly in aircraft gas turbine engines; 8% in cemented carbides for cutting and wear-resistant applications; 15% in various other metallic applications; and 31% in a variety of chemical applications. The total estimated value of cobalt consumed in 2008 was \$850 million.

Salient Statistics—United States:	2004	2005	2006	2007	2008^e
Production:					
Mine	—	—	—	—	—
Secondary	2,300	2,030	2,010	1,930	1,900
Imports for consumption	8,720	11,100	11,600	10,300	11,000
Exports	2,500	2,440	2,850	3,100	2,900
Shipments from Government stockpile excesses	1,630	1,110	260	617	200
Consumption:					
Reported (includes secondary)	8,990	9,150	9,280	9,340	9,300
Apparent ¹ (includes secondary)	9,950	11,800	11,000	9,600	10,200
Price, average annual spot for cathodes, dollars per pound	23.93	15.96	17.22	30.55	40.40
Stocks, industry, yearend	1,210	1,190	1,180	1,340	1,300
Net import reliance ² as a percentage of apparent consumption	77	83	82	80	81

Recycling: In 2008, cobalt contained in purchased scrap represented an estimated 20% of cobalt reported consumption.

Import Sources (2004-07): Cobalt contained in metal, oxide, and salts: Norway, 20%; Russia, 18%; China, 11%; Canada, 10%; and other, 41%.

Tariff:	Item	Number	Normal Trade Relations³ 12-31-08
	Cobalt ores and concentrates	2605.00.0000	Free.
	Chemical compounds:		
	Cobalt oxides and hydroxides	2822.00.0000	0.1% ad val.
	Cobalt chlorides	2827.39.6000	4.2% ad val.
	Cobalt sulfates	2833.29.1000	1.4% ad val.
	Cobalt carbonates	2836.99.1000	4.2% ad val.
	Cobalt acetates	2915.29.3000	4.2% ad val.
	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.

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

Government Stockpile: The disposal limit for cobalt in the fiscal year 2009 Annual Materials Plan was unchanged from that of fiscal year 2008.

Stockpile Status—9-30-08⁴

Material	Uncommitted inventory	Authorized for disposal	Disposal plan FY 2008	Disposals FY 2008
Cobalt	497	497	1,590	481

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Events, Trends, and Issues: During the first half of 2008, the worldwide demand for cobalt reportedly was slightly higher than that of the first half of 2007, and world availability of refined cobalt (as measured by production and U.S. Government shipments) was 5% higher than that of the first half of 2007. During 2008, production from new operations or expansions of existing operations began in Australia, Canada, Congo (Kinshasa), Cuba, Finland, and Zambia. Numerous additional brownfield and greenfield projects that would add to future world cobalt supply were in the planning and development stages. The overall trend in the price of cobalt cathode was downward during the first 11 months of 2008. Low cobalt, copper, and nickel prices and the serious downturn in the global financial markets in late 2008 were expected, however, to delay financing, construction, and startup of some new production.

The London Metal Exchange announced a plan to launch a cobalt contract during the second half of 2009. The global contract would include delivery to warehouses in Baltimore, Rotterdam, and Singapore; would trade in 1-metric-ton lots of minimum 99.3% cobalt; and be priced in dollars per kilogram.

China was the world's leading producer of refined cobalt, and much of its production was from cobalt-rich ore and partially refined cobalt imported from Congo (Kinshasa). As a result of restrictions on exports of unprocessed cobalt from Congo (Kinshasa), the Chinese cobalt industry was expected to develop more domestic and foreign sources of cobalt supply, to invest in African cobalt projects, to increase the recycling of cobalt scrap, to continue to shift its consumption towards more downstream materials, and to consolidate into fewer larger companies. Since 2005, China has been the third- or fourth-ranked supplier of cobalt imports to the United States.

World Mine Production, Reserves, and Reserve Base: Reserves and reserve base estimates for Australia were revised based on new information reported by the Australian Government.

	Mine production		Reserves ⁵	Reserve base ⁵
	2007	2008 ^e		
United States	—	—	33,000	860,000
Australia	5,900	6,300	1,500,000	1,800,000
Brazil	1,400	1,200	29,000	40,000
Canada	8,300	8,300	120,000	350,000
China	2,000	2,000	72,000	470,000
Congo (Kinshasa)	25,300	32,000	3,400,000	4,700,000
Cuba	3,800	3,900	1,000,000	1,800,000
Morocco	1,500	1,600	20,000	NA
New Caledonia ⁶	1,600	1,000	230,000	860,000
Russia	6,300	5,800	250,000	350,000
Zambia	7,600	7,800	270,000	680,000
Other countries	1,900	1,900	180,000	1,100,000
World total (rounded)	65,500	71,800	7,100,000	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, as much as 1 billion tons of hypothetical and speculative cobalt resources may 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; iron-cobalt-nickel, nickel, cermets, or ceramics in cutting and wear-resistant materials; nickel-based 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. net import reliance and secondary production, as estimated from consumption of purchased scrap.

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.