COLUMBIUM (NIOBIUM)

(Data in metric tons of columbium content, unless otherwise noted)

Domestic Production and Use: There has been no significant domestic columbium mining since 1959. Domestic columbium resources are of low grade, some mineralogically complex, and most are not commercially recoverable. Most metal, ferrocolumbium, other alloys, and compounds were produced by five companies. Feed for these plants included imported concentrates, columbium oxide, and ferrocolumbium. Consumption was mainly as ferrocolumbium by the steel industry and as columbium alloys and metal by the aerospace industry, with plants in the Eastern and Midwestern United States, California, and Washington. The estimated value of reported columbium consumption, in the form of ferrocolumbium and nickel columbium, in 2003, was about $72 million. Major end-use distribution of reported columbium consumption was as follows: superalloys, 25%; carbon steels, 21%; high-strength low-alloy steels, 20%; stainless and heat-resisting steels, 18%; alloy steels, 15%; and other, 1%.

Salient Statistics—United States:	1999	2000	2001	2002	2003[e]
Production, mine	—	—	—	—	—
Imports for consumption:					
Mineral concentrates[e]	140	300	290	290	220
Columbium metal and alloys[e]	468	607	1,050	673	870
Columbium oxide[e]	1,200	1,190	1,360	660	760
Ferrocolumbium[e]	4,450	4,400	4,480	4,030	4,000
Exports, concentrate, metal, alloys[e]	160	100	110	100	140
Government stockpile releases[e, 1]	280	217	(4)	9	182
Consumption, reported, ferrocolumbium[e, 2]	3,460	4,090	4,230	3,150	3,500
Consumption, apparent	4,100	4,300	4,400	4,100	4,300
Price:					
Columbite, dollars per pound[3]	3.00	6.25	NA	NA	NA
Ferrocolumbium, dollars per pound[4]	6.88	6.88	6.88	6.60	6.58
Net import reliance[5] as a percentage of apparent consumption	100	100	100	100	100

Recycling: Columbium was mostly recycled from products of columbium-bearing steels and superalloys; little was recovered from products specifically for their columbium content. Detailed data on the quantities of columbium recycled are not available but may compose as much as 20% of apparent consumption.

Import Sources (1999-2002): Brazil, 71%; Canada, 9%; Estonia, 5%; Germany, 4%; and other, 11%.

Tariff: Item	Number	Normal Trade Relations 12/31/03
Columbium ores and concentrates	2615.90.6030	Free.
Columbium oxide	2825.90.1500	3.7% ad val.
Ferrocolumbium:		
Less than 0.02% of P or S, or less than 0.4% of Si	7202.93.4000	5.0% ad val.
Other	7202.93.8000	5.0% ad val.
Columbium, unwrought:		
Waste and scrap	8112.92.0500	Free.
Alloys, metal, powders	8112.92.4000	4.9% ad val.
Columbium, other	8112.99.0100	4.0% ad val.

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

Government Stockpile: For fiscal year 2003, the Defense National Stockpile Center (DNSC) disposed of about 182 tons of columbium contained in columbium-tantalum mineral concentrates from the National Defense Stockpile (NDS). There were no sales of columbium metal in fiscal year 2003. The DNSC's ferrocolumbium inventory was exhausted in fiscal year 2001, and its columbium carbide inventory was exhausted in fiscal year 2002. The DNSC announced maximum disposal limits in fiscal year 2004 of about 254 tons of columbium contained in columbium concentrates and about 9 tons of columbium metal ingots. The NDS uncommitted inventories shown below include about 96 tons of columbium contained in nonstockpile-grade columbium concentrates.

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COLUMBIUM (NIOBIUM)

Stockpile Status—9-30-03[6]

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposal plan FY 2003	Disposals FY 2003
Columbium:					
Carbide powder	—	—	—	[7]10	—
Concentrates	412	113	412	254	182
Ferrocolumbium	—	—	—	—	—
Metal	37	—	37	9	—

Events, Trends, and Issues: For the first half of 2003, domestic demand for columbium ferroalloys in steelmaking and demand for columbium in superalloys (mostly for aircraft engine components) increased compared with the same period of 2002. For the same period, overall columbium imports increased; Brazil accounted for about 60% of quantity and about 40% of value. Exports also increased; Brazil, Canada, China, Mexico, and Japan were the major recipients of the columbium materials. There were no published price quotes for columbium-bearing columbite and pyrochlore concentrates. The published price for standard-grade (steelmaking-grade) ferrocolumbium was quoted at a range of $6.45 to $6.70 per pound of columbium content. The published price for high-purity ferrocolumbium was discontinued in February-March 2002 at a range of $17.50 to $18 per pound of columbium content. Industry sources indicated in December 1999 that nickel columbium sold at about $18.50 per pound of columbium content, columbium metal products sold in the range of about $24 to $100 per pound in ingot and special shape forms, and columbium oxide for master alloy production sold for about $8.80 per pound. Public information on current prices for these columbium products was not available; pricing is normally established by negotiation between buyer and seller.

World Mine Production, Reserves, and Reserve Base: The reserves estimate for Canada has been revised based on new information from that country.

	Mine production		Reserves[8]	Reserve base[8]
	2002	2003[e]		
United States	—	—	—	Negligible
Australia	290	250	29,000	NA
Brazil	26,000	26,000	4,300,000	5,200,000
Canada	3,410	3,400	110,000	NA
Congo (Kinshasa)	50	50	NA	NA
Ethiopia	6	5	NA	NA
Mozambique	5	5	NA	NA
Nigeria	30	30	NA	NA
Rwanda	76	80	NA	NA
Uganda	3	3	NA	NA
Other countries[9]	—	—	NA	NA
World total (rounded)	29,900	29,800	4,400,000	5,200,000

World Resources: Most of the world's identified resources of columbium are outside the United States and occur mainly as pyrochlore in carbonatite deposits. On a worldwide basis, resources are more than adequate to supply projected needs. The United States has approximately 150,000 tons of columbium resources in identified deposits, all of which were considered uneconomic at 2003 prices for columbium.

Substitutes: The following materials can be substituted for columbium, but a performance or cost penalty may ensue: molybdenum and vanadium as alloying elements in high-strength low-alloy steels; tantalum and titanium as alloying elements in stainless and high-strength steels; and ceramics, molybdenum, tantalum, and tungsten in high-temperature applications.

[e]Estimated. NA Not available. — Zero.

[1]Net quantity (uncommitted inventory). Parentheses indicate negative number (increase in inventory).

[2]Includes nickel columbium.

[3]Yearend average value, contained pentoxides for material having a Nb_2O_5 to Ta_2O_5 ratio of 10 to 1.

[4]Yearend average value, contained columbium, standard (steelmaking) grade.

[5]Defined as imports – exports + adjustments for Government and industry stock changes.

[6]See Appendix B for definitions.

[7]Actual quantity limited to remaining sales authority or inventory.

[8]See Appendix C for definitions.

[9]Bolivia, Burundi, China, Russia, Zambia, and Zimbabwe also produce (or are believed to produce) columbium mineral concentrates, but available information is inadequate to make reliable estimates of output levels.