COLUMBIUM (NIOBIUM)

(Data in thousand kilograms of columbium content, unless otherwise noted)

Domestic Production and Use: There has been no significant domestic columbium-mining industry since 1959, with the exception of small unreported quantities of columbium-bearing concentrates produced in 1989-92. 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 six companies with seven plants. 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 1996 was about $55 million. Major end-use distribution of reported columbium consumption was as follows: high-strength low-alloy steels, 37%; carbon steels, 33%; superalloys, 17%; stainless and heat-resisting steels, 12%; and other, 1%.

Salient Statistics—United States:	1992	1993	1994	1995	1996[e]
Production, mine	([1])	—	—	—	—
Imports for consumption:					
Concentrates, tin slags, and other[2]	NA	NA	NA	NA	NA
Ferrocolumbium[e]	2,450	2,190	2,590	3,580	2,900
Exports, concentrate, metal, and alloys[e]	350	300	320	370	300
Consumption, reported:					
Raw material	NA	NA	NA	NA	NA
Ferrocolumbium[e 3]	2,460	2,470	2,750	2,900	2,800
Consumption, apparent	3,500	3,500	3,700	3,800	3,800
Price: Columbite, dollars per pound[4]	2.83	2.67	2.60	2.97	3.00
Pyrochlore, dollars per pound[5]	2.75	2.75	NA	NA	NA
Stocks, industry, processor and consumer, yearend	NA	NA	NA	NA	NA
Employment	NA	NA	NA	NA	NA
Net import reliance[6] as a percent of apparent consumption	100	100	100	100	100

Recycling: Insignificant.

Import Sources (1992-95): Brazil, 67%; Canada, 22%; Germany, 3%; and other, 8%.

Tariff: Item	Number	Most favored nation (MFN) 12/31/96	Non-MFN[7] 12/31/96
Columbium ores and concentrates	2615.90.6030	Free	Free.
Columbium oxide	2825.90.1500	3.7% ad val.	25% ad val.
Ferrocolumbium	7202.93.0000	5.0% ad val.	25% ad val.
Columbium, unwrought:			
Waste and scrap	8112.91.0500	Free	Free.
Alloys, metal, and powders	8112.91.4000	4.9% ad val.	25% ad val.
Columbium, wrought	8112.99.0000	4.9% ad val.	45% ad val.

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

Government Stockpile: The National Defense Stockpile uncommitted inventories shown below include 343,000 kilograms in nonstockpile-grade concentrates and 151,000 kilograms in nonstockpile-grade ferrocolumbium. The Department of Defense proposed to dispose of about 27,200 kilograms of ferrocolumbium in fiscal year 1997 and about 45,400 kilograms in fiscal year 1998.

Stockpile Status—9-30-96

Material	Uncommitted inventory	Committed inventory	Authorized for disposal	Disposals Jan.-Sept. 96
Columbium:				
Carbide powder	10	—	—	—
Concentrates	786	—	—	—
Ferrocolumbium	535	—	422	—
Metal	73	—	—	—

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COLUMBIUM (NIOBIUM)

Events, Trends, and Issues: For the first one-half year, overall reported consumption of columbium decreased slightly compared with that of the previous year. Consumption of columbium by the steelmaking sector was virtually unchanged, while demand for columbium in superalloys was down by about 6%. For the same period, overall columbium imports were down by about 20%, owing to a substantial decrease in the volume of columbium mineral concentrates from Canada. Brazil was the leading supplier, providing about 60% of total imports. In late November, the published price for columbite ore was quoted at a range of $2.80 to $3.20 per pound of contained columbium and tantalum pentoxides. The published price for steelmaking-grade ferrocolumbium was quoted at $6.58 per pound of contained columbium, and for high-purity ferrocolumbium and nickel columbium at $18.50 and $20.50 per pound of contained columbium, respectively. The published price for columbium oxide was quoted at $8.17 per pound of oxide, and the published price for columbium metal was quoted at a range of $30 to $50 per pound.

It is estimated that in 1997 domestic columbium mine production will be zero and U.S. apparent consumption will be about 3.9 million kilograms. The majority of total U.S. demand will be supplied by columbium imports in upgraded forms.

World Mine Production, Reserves, and Reserve Base:

	Mine production		Reserves[e 8]	Reserve base[e 8]
	1995	1996[e]		
United States	—	—	—	Negligible
Australia	109	110	NA	NA
Brazil	15,300	15,000	3,300,000	3,600,000
Canada	2,360	2,400	140,000	410,000
Nigeria	13	10	64,000	91,000
Zaire	1	1	32,000	91,000
Zimbabwe	1	1	NA	NA
Other countries[9]	—	1	6,000	9,000
World total (rounded)	17,800	17,500	3,500,000	4,200,000

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 360 million kilograms of columbium resources in identified deposits, most of which were considered uneconomic at 1996 prices for columbium.

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

[e]Estimated. NA Not available.

[1]A small unreported quantity was produced.

[2]Metal, alloys, synthetic concentrates, and columbium oxide.

[3]Includes nickel columbium and a small quantity of other columbium materials.

[4]Average value, contained pentoxides for material having a Nb_2O_5 to Ta_2O_5 ratio of 10 to 1.

[5]Average value, contained pentoxide.

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

[7]See Appendix B.

[8]See Appendix C for definitions.

[9]Excludes any production from Bolivia, China, and countries in the former Soviet Union.