

NIOBIUM (COLUMBIUM)

(Data in metric tons of contained niobium unless otherwise noted)

Domestic Production and Use: Significant U.S. niobium mine production has not been reported since 1959. Companies in the United States produced niobium-containing materials from imported niobium concentrates, oxides, and ferroniobium. Niobium was consumed mostly in the form of ferroniobium by the steel industry and as niobium alloys and metal by the aerospace industry. Major end-use distribution of domestic niobium consumption was estimated as follows: steels, about 75%, and superalloys, about 25%. The estimated value of niobium consumption was \$440 million, as measured by the value of imports.

Salient Statistics—United States:	2018	2019	2020	2021	2022^e
Production, mine	—	—	—	—	—
Imports for consumption ¹	11,200	10,100	7,200	8,290	8,800
Exports ¹	955	668	793	1,010	1,200
Shipments from Government stockpile ²	-76	-84	-88	-1	0
Consumption: ^e					
Apparent ³	10,100	9,360	6,320	7,280	7,600
Reported ⁴	6,850	6,680	6,040	6,140	5,600
Price, average unit value, ferroniobium, dollars per kilogram ⁵	21	22	20	20	24
Net import reliance ³ as a percentage of apparent consumption	100	100	100	100	100

Recycling: Niobium was recycled when niobium-bearing steels and superalloys were recycled; scrap recovery, specifically for niobium content, was negligible. The amount of niobium recycled is not available, but it may be as much as 20% of apparent consumption.

Import Sources (2018–21): Niobium and tantalum ores and concentrates: Australia, 42%; Rwanda, 21%; Congo (Kinshasa), 12%; Mozambique, 7%; and other, 18%. Niobium oxide: Brazil, 72%; Estonia, 5%; China, 2%; Germany, 1%; and other, 20%. Ferroniobium and niobium metal: Brazil, 67%; Canada, 28%; Russia, 3%, Germany, 1%, and other, 1%. Total imports: Brazil, 66%; Canada, 25%; and other, 9%. Of U.S. niobium material imports (by contained weight), 74% was ferroniobium, 16% was niobium metal, 9% was niobium oxide, and 1% was niobium ores and concentrates.

Tariff:	Item	Number	Normal Trade Relations 12–31–22
	Synthetic tantalum-niobium concentrates	2615.90.3000	Free.
	Niobium ores and concentrates	2615.90.6030	Free.
	Niobium oxide	2825.90.1500	3.7% ad valorem.
	Ferroniobium:		
	Less than 0.02% phosphorus or sulfur, or less than 0.4% silicon	7202.93.4000	5% ad valorem.
	Other	7202.93.8000	5% ad valorem.
	Niobium:		
	Waste and scrap ⁶	8112.92.0700	Free.
	Powders and unwrought metal	8112.92.4000	4.9% ad valorem.
	Other ⁶	8112.99.9100	4% ad valorem.

Depletion Allowance: 22% (domestic), 14% (foreign).

Government Stockpile:⁷

Material	Inventory as of 9–30–22	FY 2022		FY 2023	
		Potential acquisitions	Potential disposals	Potential acquisitions	Potential disposals
Ferroniobium (gross weight)	544	—	—	—	—
Niobium metal (gross weight)	10	—	—	—	—

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Events, Trends, and Issues: In 2022, U.S. niobium apparent consumption (measured in niobium content) was estimated to be 7,600 tons, a 4% increase from that in 2021. One domestic company developing its Elk Creek project in Nebraska announced the results of its 2022 feasibility study. According to the study, the mining and processing operation is expected to produce 7,350 tons per year of ferroniobium, 102 tons per year of scandium trioxide, and 12,060 tons per year of titanium dioxide over a 38-year mine life. The project would be the only niobium mine and primary niobium-processing facility in the United States, with construction to begin after financing is received as required permits have been obtained.

Brazil continued to be the world's leading niobium producer, accounting for approximately 89% of global production, followed by Canada with about 8%. According to international trade statistics under the Harmonized Tariff Schedule of the United States code 7202.93 (ferroniobium), Brazil's total exports were 56,700 tons from January through August 2022, 6% less than during the same period in 2021. Most of Brazil's exports were sent to China, followed by the Netherlands and Singapore.

In 2022, a leading niobium producer in Brazil announced plans to invest \$1.7 billion in its production assets to double its sales volume by 2030. The company completed its most recent facility upgrades in late 2021, increasing its total production capacity of ferroniobium to 150,000 metric tons per year (approximately 98,000 tons per year of niobium content). The completion of those projects would provide a significant increase in production in Brazil over the next decade.

World Mine Production and Reserves: Reserves for the United States were revised based on company reports.

	Mine production		Reserves ⁸
	<u>2021</u>	<u>2022^e</u>	
United States	—	—	210,000
Brazil	78,700	71,000	16,000,000
Canada	7,500	6,500	1,600,000
Congo (Kinshasa)	580	600	NA
Russia	450	450	NA
Rwanda	158	210	NA
Other countries	<u>170</u>	<u>190</u>	<u>NA</u>
World total (rounded)	87,600	79,000	>17,000,000

World Resources:⁸ World resources of niobium are more than adequate to supply projected needs. Most of the world's identified resources of niobium occur as pyrochlore in carbonatite (igneous rocks that contain more than 50%-by-volume carbonate minerals) deposits and are outside the United States.

Substitutes: The following materials can be substituted for niobium, but a performance loss or higher cost may ensue: ceramic matrix composites, molybdenum, tantalum, and tungsten in high-temperature (superalloy) applications; molybdenum, tantalum, and titanium as alloying elements in stainless and high-strength steels; and molybdenum and vanadium as alloying elements in high-strength low-alloy steels.

^eEstimated. NA Not available. — Zero.

¹Imports and exports include the estimated niobium content of ferroniobium, niobium and tantalum ores and concentrates, niobium oxide, and niobium powders and unwrought metal.

²Defined as change in total inventory from prior yearend inventory. If negative, increase in inventory.

³Defined as imports – exports ± adjustments for Government stock changes.

⁴Only includes ferroniobium and nickel niobium.

⁵Unit value is weighted average unit value of gross weight of U.S. ferroniobium trade (imports plus exports.)

⁶This category includes niobium-containing material and other material.

⁷See Appendix B for definitions.

⁸See Appendix C for resource and reserve definitions and information concerning data sources.