

NIOBIUM (COLUMBIUM)

(Data in metric tons of niobium content 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. In 2020, there was a decrease in reported consumption of niobium for high-strength low-alloy steel and superalloy applications. Major end-use distribution of reported niobium consumption was as follows: steels, about 81%, and superalloys, about 19%. The estimated value of niobium consumption was \$280 million, as measured by the value of imports.

Salient Statistics—United States:	2016	2017	2018	2019	2020^e
Production, mine	—	—	—	—	—
Imports for consumption ¹	8,250	9,330	11,200	10,100	7,500
Exports ¹	1,480	1,490	955	668	520
Shipments from Government stockpile	—	—	—	—	—
Consumption: ^e					
Apparent ²	6,730	7,780	10,100	9,370	6,900
Reported ³	7,370	7,640	6,850	6,880	5,500
Price, unit value, ferroniobium, dollars per kilogram ⁴	21	20	21	23	24
Net import reliance ² 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 (2016–19): Niobium and tantalum ores and concentrates: Rwanda, 36%; Australia, 25%; Brazil, 14%; Congo (Kinshasa), 7%; and other, 18%. Niobium oxide: Brazil, 54%; Russia, 19%; Thailand, 11%; Estonia, 7%; and other, 9%. Ferroniobium and niobium metal: Brazil, 68%; Canada, 25%; Germany, 5%, Russia, 1%; and other, 1%. Total imports: Brazil, 66%; Canada, 22%; Germany, 4%; Russia, 3%; and other, 5%. Of the U.S. niobium material imports (by contained weight), 76% was ferroniobium, 14% was niobium metal, 9% was niobium oxide, and 1% was niobium ores and concentrates.

Tariff:	Item	Number	Normal Trade Relations 12–31–20
	Synthetic tantalum-niobium concentrates	2615.90.3000	Free.
	Niobium ores and concentrates	2615.90.6030	Free.
	Niobium oxide	2825.90.1500	3.7% ad val.
	Ferroniobium:		
	Less than 0.02% P or S, or less than 0.4% Si	7202.93.4000	5% ad val.
	Other	7202.93.8000	5% ad val.
	Niobium:		
	Waste and scrap ⁵	8112.92.0600	Free.
	Powders and unwrought metal	8112.92.4000	4.9% ad val.
	Niobium, other ⁵	8112.99.9000	4% ad val.

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

Government Stockpile:⁶

Material	Inventory as of 9–30–20	FY 2020		FY 2021	
		Potential acquisitions	Potential disposals	Potential acquisitions	Potential disposals
Ferroniobium (gross weight)	542	—	—	—	—
Niobium metal (gross weight)	10	—	—	—	—

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Events, Trends, and Issues: Niobium principally was imported in the form of ferroniobium. Based on data through August 2020, U.S. niobium apparent consumption (measured in contained niobium) for 2020 was estimated to be 6,900 tons, a 26% decrease from that of 2019. Brazil continued to be the world's leading niobium producer with 91% of global production, followed by Canada with 8%. Significant production decreases by major aircraft manufacturers reduced niobium consumption for superalloys. Global niobium production and consumption was thought to have decreased in 2020 owing to a decrease in steel production in most countries caused by the COVID-19 pandemic. A significant decrease in ferrovanadium prices in 2020 was also a factor in reduced ferroniobium consumption. In 2019, consumption of ferroniobium, especially in China, had increased in part because it was used as a substitute for ferrovanadium by some producers of high-strength low-alloy steel owing to the supply deficit and high price volatility of ferrovanadium. In the first 9 months of 2020, China's imports of ferrovanadium increased by 700% while ferroniobium imports decreased by 36% compared with those in the same period of 2019, suggesting that some reverse substitution was taking place. Total exports of ferroniobium to all countries from Brazil, the leading producing country, decreased by 35% during the first 9 months of 2020 compared with exports during the same period of 2019.

One domestic company developing its Elk Creek project in Nebraska announced that it had secured options to purchase all the land needed for the mine and processing facility. The company received its construction air permit from the State of Nebraska in June. The project would be the only niobium mine and primary niobium processing facility in the United States, with construction to begin after financing was obtained.

A leading niobium producer in Brazil was in the process of increasing its annual ferroniobium production capacity by 50% to 150,000 tons per year (approximately 98,000 tons per year of contained niobium). Originally expected by the end of 2020, the expansion was to be completed in 2021.

World Mine Production and Reserves:⁷ The reserves data for Brazil were revised based on information reported by the Government of Brazil, and reserves data for the United States were revised based on company reports.

	Mine production		Reserves⁷
	<u>2019</u>	<u>2020^e</u>	
United States	—	—	170,000
Brazil	88,900	71,000	16,000,000
Canada	6,800	6,200	1,600,000
Other countries	<u>1,250</u>	<u>1,000</u>	<u>NA</u>
World total (rounded)	97,000	78,000	>17,000,000

World Resources:⁷ 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 imports – exports + adjustments for Government stock changes.

³Only includes ferroniobium and nickel niobium.

⁴Unit value is weighted average unit value of gross weight of U.S. ferroniobium trade. (Trade is imports plus exports.)

⁵This category includes niobium-containing material and other material.

⁶See Appendix B for definitions.

⁷See Appendix C for resource and reserve definitions and information concerning data source.