

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. Domestic niobium resources are of low grade, some are mineralogically complex, and most are not commercially recoverable. Companies in the United States produced niobium-containing materials from imported niobium minerals, 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 reported niobium consumption was as follows: steels, about 75%, and superalloys, about 25%. In 2018, the estimated value of niobium consumption was \$310 million, as measured by the value of imports.

Salient Statistics—United States:	2014	2015	2016	2017	2018^e
Production, mine	—	—	—	—	—
Imports for consumption ¹	11,100	8,520	8,250	9,370	11,000
Exports ¹	1,110	1,430	1,480	1,490	1,000
Shipments from Government stockpile	—	—	—	—	—
Consumption: ^e					
Apparent ²	10,000	7,080	6,730	7,820	10,000
Reported ³	8,210	7,510	7,370	7,510	9,000
Unit value, ferroniobium, dollars per kilogram ⁴	26	24	21	20	21
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 (2014–17): Niobium ore and concentrate: Brazil, 35%; Rwanda, 31%; Australia, 15%; Congo (Kinshasa), 8%; and other, 11%. Niobium oxide: Brazil, 44%; Russia, 30%; Thailand, 9%; Estonia, 7%; and other, 10%. Ferroniobium and niobium metal: Brazil, 76%; Canada, 21%; Germany, 2%; and other, 1%. Total imports: Brazil, 72%; Canada, 18%; Russia, 3%; Germany, 2%; and other, 5%. Of the U.S. niobium material imports, 99% (by gross weight) was ferroniobium, niobium metal, and niobium oxide.

Tariff:	Item	Number	Normal Trade Relations 12–31–18
	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 9–30–18	FY2018		FY 2019	
		Potential Acquisitions	Potential Disposals⁷	Potential Acquisitions	Potential Disposals⁷
Ferroniobium (gross weight)	278	209	—	209	—
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 July 2018, U.S. niobium apparent consumption (measured in contained niobium) was estimated to be 10,000 metric tons, 27% more than that of 2017. Brazil continued to be the world's leading niobium producer with 88% of global production, followed by Canada with 10%.

In May 2018, the U.S. Department of the Interior, in coordination with other executive branch agencies, published a list of 35 critical minerals (83 FR 23295), including niobium. This list was developed to serve as an initial focus, pursuant to Executive Order 13817, "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals" (82 FR 60835).

One domestic company continued to make progress developing its Elk Creek project in Nebraska by securing all major Federal permits and completing a proposed engineering design for its underground mine. The project would be the only niobium mine and primary niobium processing facility in the United States. It was expected to begin production after 2019.

In July 2018, a company from Japan acquired all shares of the niobium-tantalum business of a company from Germany. The business was headquartered in Munich, Germany, and included niobium processing and manufacturing facilities in Baden-Württemberg and Lower Saxony States, Germany, as well as Ibaraki Prefecture, Japan, and Rayong Province, Thailand.

World Mine Production and Reserves: The reserves data for the United States, Brazil, and Canada were revised based on information reported by niobium-producing companies and the Governments of those countries.

	Mine production		Reserves ⁸
	<u>2017</u>	<u>2018^e</u>	
United States	—	—	180,000
Brazil	60,700	60,000	7,300,000
Canada	6,980	7,000	1,600,000
Other countries	<u>1,410</u>	<u>1,000</u>	NA
World total (rounded)	69,100	68,000	>9,100,000

World Resources: 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. The United States has approximately 868,000 tons of niobium in identified resources, most of which were considered subeconomic at 2018 prices for niobium.

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.

⁷Disposals are defined as any barter, rotation, sale, or upgrade of National Defense Stockpile stock.

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