

## 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 ferroniobium and niobium compounds, metal, and other alloys 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, 75%; and superalloys, 25%. In 2010, the estimated value of niobium consumption was \$330 million and was expected to be about \$400 million in 2011, as measured by the value of imports.

<b>Salient Statistics—United States:</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011<sup>e</sup></b>
Production:					
Mine	—	—	—	—	—
Secondary	NA	NA	NA	NA	NA
Imports for consumption <sup>e, 1</sup>	10,120	9,230	4,400	8,500	9,200
Exports <sup>e, 1</sup>	1,100	781	195	281	430
Government stockpile releases <sup>e, 2</sup>	—	—	—	—	—
Consumption: <sup>e</sup>					
Apparent	9,020	8,450	4,210	8,070	8,800
Reported <sup>3</sup>	6,510	5,380	4,350	5,590	4,400
Unit value, ferroniobium, dollars per metric ton <sup>4</sup>	21,918	34,398	37,298	37,781	41,000
Net import reliance <sup>5</sup> 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 (2007–10):** Niobium contained in niobium and tantalum ore and concentrate; ferroniobium; and niobium metal and oxide: Brazil, 85%; Canada, 10%; Germany, 2%; Russia, 1%; and other, 2%.

<b>Tariff:</b>	<b>Item</b>	<b>Number</b>	<b>Normal Trade Relations</b>
			<b>12-31-11</b>
	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% 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.
	Niobium, unwrought:		
	Waste and scrap <sup>6</sup>	8112.92.0600	Free.
	Alloys, metal, powders	8112.92.4000	4.9% ad val.
	Niobium, other <sup>6</sup>	8112.99.9000	4.0% ad val.

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

**Government Stockpile:** For fiscal year (FY) 2011, which ended on September 30, 2011, the Defense Logistics Agency, DLA Strategic Materials disposed of no niobium materials. The DLA Strategic Materials did not announce a maximum disposal limit for niobium metal in FY 2012. The DLA Strategic Materials' niobium mineral concentrate inventory was exhausted in FY 2007; niobium carbide powder, in FY 2002; and ferroniobium, in FY 2001.

<b>Material</b>	<b>Stockpile Status—9-30-11<sup>7</sup></b>			
	<b>Uncommitted inventory</b>	<b>Authorized for disposal</b>	<b>Disposal plan FY 2011</b>	<b>Disposals FY 2011</b>
Niobium metal	10.1	10.1	—	—

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**Events, Trends, and Issues:** Niobium principally was imported in the form of ferroniobium and niobium unwrought metal, alloy, and powder. United States niobium import dependence was expected to be the same in 2011 as in 2010, when Brazil was the leading niobium supplier. By weight in 2010, Brazil supplied 87% of total U.S. niobium imports, 86% of ferroniobium, 93% of niobium metal, and 85% of niobium oxide. The leading suppliers of niobium in ore and concentrate were China (43%) and Brazil (26%). Financial market problems in 2008 and the subsequent economic slowdown resulted in reduced niobium material consumption in 2009. Niobium apparent consumption is believed to have continued an upward trend in 2011; however, the debt crisis in Europe threatened that recovery. In 2011, the British Geological Survey published a niobium-tantalum minerals profile (<http://www.bgs.ac.uk/downloads/start.cfm?id=2033>).

**World Mine Production and Reserves:** Canada's reserves were changed to proven plus probable reserves from proven reserves; data were updated (for the Niobec Mine) and another property added (Thor Lake), based on company reports.

	Mine production		Reserves <sup>8</sup>
	<u>2010</u>	<u>2011<sup>e</sup></u>	
United States	—	—	—
Brazil	58,000	58,000	2,900,000
Canada	4,420	4,400	200,000
Other countries	<u>520</u>	<u>600</u>	<u>NA</u>
World total (rounded)	62,900	63,000	3,000,000

**World Resources:** World resources of niobium are more than adequate to supply projected needs. Most of the world's identified resources of niobium occur mainly as pyrochlore in carbonatite [igneous rocks that contain more than 50% by volume carbonate (CO<sub>3</sub>) minerals] deposits and are outside the United States. The United States has approximately 150,000 tons of niobium resources in identified deposits, all of which were considered uneconomic at 2011 prices for niobium.

**Substitutes:** The following materials can be substituted for niobium, 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.

<sup>e</sup>Estimated. NA Not available. — Zero.

<sup>1</sup>Imports and exports include the estimated niobium content of niobium and tantalum ores and concentrates, niobium oxide, ferroniobium, niobium unwrought alloys, metal, and powder.

<sup>2</sup>Government stockpile inventory reported by DLA Strategic Materials is the basis for estimating Government stockpile releases.

<sup>3</sup>Includes ferroniobium and nickel niobium.

<sup>4</sup>Unit value is mass-weighted average U.S. import value of ferroniobium assuming 65% niobium content. To convert dollars per metric ton to dollars per pound, divide by 2,205.

<sup>5</sup>Defined as imports – exports + adjustments for Government and industry stock changes.

<sup>6</sup>This category includes other than niobium-containing material.

<sup>7</sup>[See Appendix B for definitions.](#)

<sup>8</sup>[See Appendix C for resource/reserve definitions and information concerning data sources.](#)